THE FUNDAMENTALS

OF PSYCHOLOGY

A BRIEF ACCOUNT OF THE NATURE AND DEVELOPMENT OF MENTAL PROCESSES

BY

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Of course it is Good Book
you are a fool.

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PREFACE.

Whether we choose to call it *psychology* or not, some study of the mental processes of the child must be undertaken by all those who aspire to educate him. The only serious objection which can be made to the inclusion of "psychology as such" in the curriculum of a training college is that frequently what is taught is not psychology at all. It consists of a number of definitions of technical terms, without any real attempt to give an insight into the processes referred to by those terms: it "furnishes the student merely with a psychological phraseology and not with any real knowledge of mental processes."[1]

Some have suggested that the psychology taught in a training college should be taken entirely on inductive lines. We should, according to these people, examine the teaching of the various subjects, and our psychology should arise out of this examination. There is much to be said for this view. But, under such circumstances, the psychological teaching would be very sporadic and uneven. For, in these days, the teaching of the various subjects is often placed under the control of the special lecturers in those subjects, and the amount of psychological insight must vary greatly.

It is significant, too, that much of the best work in connection with the principles of teaching the different subjects has been done by those who have had a preliminary training in "pure" psychology. A clear insight into the mental processes involved does not arise readily

[1] Darroch, *The Place of Psychology in the Training of the Teacher*, p. 12.

from attention to the methods of teaching alone. A knowledge of mental processes acquired by the traditional reading and lecture methods goes far to enlighten the inductive inquiry in the realm of the special subject.

"There is, indeed, a tendency to lose sight of the fact that induction does not start merely from the concrete. Induction in the true sense is an examination of the concrete directed by certain ideas which we already possess. True, it is the recognised inadequacy of those ideas which leads us to seek further. But, such as they are, they nevertheless guide our researches. *Man sieht nur was man weiss.* The more one already knows, the more definitely can one seek for further knowledge. The *Fragestellung* is the most important preliminary to induction, and it can only be framed on the basis of the knowledge which we already have.

The student, therefore, who comes to the consideration of the methods of teaching a given subject with some notions of mental process already formed is more likely to understand the nature of his task than one who begins his inquiry without any clear conception of mind and its working.

"Unless the student of education undertakes the study of Psychology, in the first place, for its own sake and in order that he may understand what goes on in the acquisition and organisation of experience; and, in the second place, in order that he may gain a knowledge of how to regulate the acquisition and organisation of experience within the minds of his pupils, then he can never carry on his work in a truly professional spirit." [1]

By all means let the preliminary outline of mental processes be in close touch with school work. In this

[1] Darroch, *op. cit.*, p. 8.

book continual reference is made to teaching. Almost all the illustrations deal with cases which arise in connection with the school. The student who works carefully through the book will, therefore, approach the question of "special method" with some tolerably clear ideas of the nature of his problem.

To each chapter questions have been appended. Some of these require merely careful reproduction of the matter dealt with in the chapter. Others, however, require the application of the ideas dealt with in the chapter to new problems. In all cases the questions should furnish a stimulus to careful reading and understanding. The writer attaches considerable importance to such questions. Students can easily be induced to read and vaguely understand textbooks in psychology. But such work is of little value unless it is rendered strenuous and exact by the attempt to answer questions. It depends, after all, on the same principles as those which lead us to require clear and connected reproduction, or the working of exercises, from the school children.

It may be pointed out that the lecturer who adopts such a book as this can frame his own questions. The writer does not presume to limit the ingenuity of any lecturer, or to dictate the special methods to be pursued. He merely desires to save some time and trouble.. For it takes considerable time and trouble to frame suitable questions. And there is the further time necessary for communicating them to the students. The lecture-period is all too short without cutting into it for such purposes. The writer, in dealing with this course in his own classes, indeed, took the trouble to "graph" copies of the questions, so that time might be saved.

A glance at the foot-notes will reveal the author's immense indebtedness to a great number of psychologists, especially to McDougall and James.

It is hoped, therefore, that the psychology expounded in this book will be found thoroughly "sound." While the author has emphasised the effects of pleasure-pain more than some writers seem inclined to do, he ventures to assert that he has assigned to conation all the importance which the modern views of mind require.

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PREFACE TO THE SECOND EDITION.

The appearance of so many books on the "New" Psychology has led some to suppose that the "Old" is superannuated. This is far from being the case. The "New" is merely supplementary to the "Old." And if the study of the former causes the neglect of the latter, much harm will have been done.

To this edition has been added a lengthy chapter which, it is hoped, does ample justice to recent developments.

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PREFACE TO THE THIRD EDITION.

DURING the past ten or twelve years, the welter of speculation and experiment in psychology has been such as to cast the ordinary student into a state of confusion and dismay. To take a striking example, the *Gestalt* Psychologists tell us that the Doctrine of Association must go; and the *Behaviourists* maintain that, while Association must remain, the *mental* elements which are associated must be ignored. Can we accept either of these views in its entirety? Are we to believe that the many great thinkers from Aristotle to Locke, from Reid to Spencer, and from Mill to James, have all been occupied with futility?

By all means let us refrain from worshipping the thinkers of the past as infallible. But let us not fly to the other extreme of sweeping aside with contempt the chief results of their cogitation. John Stuart Mill attributed to the Laws of Association the same place in Psychology as the Law of Gravitation holds in Astronomy. If, however, the *Gestalt* Psychologists are right, there has been a great revolution, and Mill has been completely superseded. We may agree that Mill's statement was too absolute, and that there are certain gaps in psychological theory as presented to us by thinkers of the past which the *Gestalt* Psychologists, as well as other modern thinkers of quite different views, have exposed. But the chief framework still stands, and cannot be dispensed with.

The best course, therefore, seems to be to examine the new ideas, and to endeavour to put them in their proper relations with the results of past speculation. This is

what is attempted in the further chapter added to this edition. It is, of course, impossible to give more than slight sketches of the new theories. But it is hoped that there will be found sufficient explanation of them to enable the student who has already laid a sound foundation to his psychological thought to understand the new views and to give them as much weight as they deserve.

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July, 1938.

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FUNDAMENTALS OF PSYCHOLOGY.

CHAPTER I.

THE NEED OF A STUDY OF PSYCHOLOGY AS A BASIS FOR EDUCATIONAL THEORY.

UNTIL quite recent times, the only characteristic qualification of a teacher was considered to be that he must know the matter which he sets out to teach. True, this has seldom been regarded as the sole qualification. It has long been known that good students are sometimes poor teachers—especially where many pupils are to be taught together. The power of control, a somewhat mysterious means of influencing others to attention and obedience, has always been considered an important additional qualification. It has also been expected that the teacher should be a person of good moral character. But these qualities being taken for granted, the chief requirement has usually been a knowledge of the subject or subjects which it is proposed to teach.

This conception of the qualified teacher still holds the field in many universities and secondary schools. It is, of course, recognised that *education* includes more than *instruction*. *Instruction* is the mere imparting of information or guidance. *Education* is the cultivation of all the moral, intellectual, and physical powers. In its widest sense it includes all the influences which act upon the individual. "Whatever helps to shape the human being, to make the human being what he is, or hinder him from

being what he is not, is part of his education" (J. S. Mill). Universities and schools influence the individual who enters them in many more ways than those confined to the lecture or lesson. Many teachers educate their pupils far more by their personal example, and by their general influence over them, than by the definite instruction which they give to them. The tradition and reputation of a school or university have often a most lasting effect on the lives of its alumni. For a large number of young people the education obtained by contact with fellow-pupils, both in work and play, is far more important than either the instruction or the other educational influences received from the teachers. And this is some justification for those parents who send their children to schools where the teachers are poorly qualified, but where most of the children are respectable and of good manners.

But, although all this is usually admitted, it is still thought in some quarters that, as far as the instruction alone is concerned, a knowledge of the subject on the part of the teacher is the only essential. Almost every reflecting person agrees that it is a most important qualification. Yet at least one distinguished educationist has denied its necessity. Jacotot, a French professor of the early part of the nineteenth century, went so far as to maintain that the teacher need not know the subject to be studied, that a man can cause pupils to learn what he does not know himself.

There is some truth in this. It is true that the pupils in some cases learn more of the subject than the teacher explicitly expounds. It is true, as we shall see more clearly later on, that we ought not to tell the pupils everything, but should rather induce them to discover much for themselves. It is true that a person who has studied some subjects himself can in a general way direct the efforts of pupils in other and similar subjects which he has not himself attacked. It is also certain that, without giving any direct guidance, one may supply motives which will induce the pupils to attack subjects entirely by themselves. Thus a parent used to offer his children a penny for each of Watts's hymns which was

learned correctly by heart. Where, however, the best possible progress is to be made, and where the subject rises above such mechanical processes as learning by heart, there is little doubt that the teacher or parent who holds himself responsible for the learning can be most successful when he is himself thoroughly familiar with the subject in question.

Yet a knowledge of the subject to be taught, though a necessary preliminary qualification, is far from being sufficient. Even if we turn aside for the moment from the broad view of education as a process whereby the many-sided nature of the child is harmoniously developed, and confine ourselves merely to that part which is concerned with instruction in certain branches, we shall find that knowledge of the subject, by itself, will not carry us far. Too often instruction is considered as a mere giving. If I have a penny, I can give it to you. If I know the name of a person, I can tell it to you. The thing seems simplicity itself. Yet even in these uncomplicated cases more is necessary. I must be assured of a capacity for reception in you. You may not want my penny, or you may be deaf to the sounds which I utter. In such simple instances as these, it is usually so easy to ascertain whether what is proffered can be received that no thought is expended upon it. But in many cases, and especially when the thing to be given or told is more complicated, the question of the capacity for reception of the beneficiary assumes great importance. To Crusoe on his island a pennyworth of nails is a far more acceptable present than a five pound note; a baby of three years will listen eagerly to the tale of the Three Bears, but will be totally unreceptive to a discourse on the uses of adversity.

Even with regard to comparatively simple pieces of information, much confusion arises because the teller is not clear as to the state of mind of the enquirer. Ask a man in the street the way, when to get to your destination involves some amount of twisting and turning in a district with which you are unfamiliar. and you will be fortunate if you get clear directions. The majority of persons talk glibly of landmarks and signs with which *they* are

perfectly acquainted, quite oblivious of the fact that *you* are completely in the dark. If knowledge of the subjects to be taught were the only really important thing, thousands of adults of the lower middle classes could be considered eligible for the teaching of our elementary scholars without any training being necessary. As we have just seen, however, a full knowledge of the matter to be imparted may *by itself* be rather a danger than a help. It may render the imparter of information unable to appreciate, and allow for, the ignorance of the enquirer.

Nor is it merely a question of realising the gaps in our pupils' minds, and carefully filling them up. Much of the knowledge which we acquire cannot be directly imparted as a name or the description of the way to a certain place can be imparted. It is the result of a process of growth taking place within us. Froebel was keenly aware of this when he compared the teacher to a gardener, the child to a plant, and the school to a garden. A gardener cannot directly add to the height of a plant as a builder adds an extra storey to a house. The gardener plants his seedling in a suitable place. He hoes, waters, prunes, and manures. He does not, however, do these things indiscriminately. From his knowledge of the plant, he judges when and to what extent they are necessary. And when he has done all, he can only hope for the best.

It is not asserted that all knowledge arises in this self-developing manner. It is obvious that if I tell you the way to a given place, I have directly increased your knowledge. It is equally obvious, however, that I cannot tell a child of three years what a *summary* is. He will require a long process of development before any words that I may use will enable him to get a clear idea of the meaning. It is related that a gentleman in addressing a Sunday School once made use of this word. The superintendent hinted to him that the children did not understand it. He accordingly told the children: "A summary is an abbreviated synopsis."

The process of acquiring knowledge involves, then, a great deal of *self-activity*. It is not a matter of passive reception. In modern times, when so many oral lessons

are given in the elementary schools, there is a danger of forgetting this. In former days, children were left more to themselves in school. They were given tasks—lessons to prepare, problems to solve, questions to answer—and were merely examined on them. Not that the teachers of those days understood more of psychology than those of to-day. Many good methods have been adopted without any clear notion of the reasons for them. Even now, in spite of some progress in psychology, a large part of school practice is carried on without a full comprehension of the principles underlying it. We cannot afford to wait till everything is clear theoretically. We must go on with our teaching. The children cannot stop till we have solved our difficulties. We hope, however, to understand more and more the reasons for our practice as we proceed, and, in so far as we do that, we can improve our methods.

Meanwhile we often fall into certain methods by force of circumstances. The teachers of the olden times were few in number, their scholars were numerous and varied in attainments; further, there was little idea of *teaching* beyond that of seeing that something was learned. In these days the value of teaching has become clearly recognised; we have classes of children who, though still too many in number, are approximately on the same levels of attainment, and there is a tendency to overdo oral exposition. Someone has said that whereas formerly the child learned his lesson and said it to the teacher, now the teacher learns his lesson and says it to the child. "In short, many modern methods of teaching, in attempting to make learning easy to the child, give so minute a guidance of action that they eliminate all virility from the learning by banishing purpose, effort, and originality. But without the cultivation of these the habit of expecting by one's own efforts to reach better things than those of the present cannot be formed." [1]

Though much may profitably be told, especially if the right time is taken for imparting the information, mere telling will not take us far. The fact is, as we have

[1] Welton, *The Psychology of Education*, p. 175.

already hinted, that a great deal cannot by any manner of means be told. It must *develop*. And it can only be developed from knowledge already obtained by the child himself. I cannot really tell a child what *colour* is. The idea of colour must develop in his mind on the basis of the knowledge he acquires of blue, red, green, and so forth. I can arrange that he sees objects of different colours, and that he thinks of them with respect to their appearance. And even if I use the word *colour*, and go on to indicate to him what I mean by it, I am only helping on a process *which must take place in his mind*, and which could not take place if he had not seen different colours and recognised them for himself. When once he has reached this stage, I can make use of the knowledge he has already acquired by himself, in telling him some things which he may never be able to discover for himself. For instance, I can tell him that the birds of South America have brighter and more varied colouring than those of England.

A great deal of what is told *could* be discovered by the pupil, if only life were long enough. If, however, nothing were told which could be discovered, the child would grow up very ignorant. Those who may be considered well educated members of the community have attained this stage by getting much knowledge at second-hand, by taking advantage of information acquired at first-hand by many others—ancestors and contemporaries. It would seem, then, that we have only to distinguish in knowledge (1) what must be acquired independently by the child, from (2) what can be told on the basis of what has been acquired at first hand, and then to allow all the latter to be told.

But, in the first place, it is very difficult to make the distinction. To revert to the instance which has just been mentioned, the child hears people speaking of the *colour* of different objects. He notices the various hues, and he gets an idea of colour in general. In one sense, as we have insisted, he may be said to have acquired this himself. But the mention of the word *colour* has been a great help in directing his attention, and although nobody may have definitely spoken on the subject to him, it may be said

that to a certain extent he has been told. Practically all our knowledge may be expressed in words, and all these words are in one sense "told" to us by others, in another understood by us in virtue of our own experience.

In view of the difficulty of fixing the limits between what must be acquired by the individual independently and what can be told, it is better to be on the safe side, and to err in requiring more to be discovered by the individual than is absolutely necessary. For if we err in the other direction the mistake is irreparable: we try to tell the child something which he can only find out for himself. And unless he does find out for himself independently of us, there is a gap in his knowledge; he will hear and perhaps use words which have only a shadow of meaning for him. This is what Milton meant when he wrote: "But because our understanding cannot in this body found it self but on sensible things, nor arrive so clearly to the knowledge of God and things invisible, as by orderly conning over the visible and inferior creature, the same method is necessarily to be follow'd in all discreet teaching. . . . And though a Linguist should pride himself to have all the Tongues that *Babel* cleft the world into, yet, if he have not studied the solid things in them as well as the Words and Lexicons, he were nothing so much to be esteemed a learned man, as any Yeoman or Tradesman competently wise in his Mother Dialect only."[1]

But there is a further reason why children, especially in the early stages of their education, should not be told too much. We have said that the acquirement of all knowledge involves self-activity. There is less activity, however, in listening to the words of others, even when we attach to them the full meaning intended, than in finding out for ourselves. Further, the process by which in later life we acquire much knowledge at second-hand is not one of mere reception of information. We go to libraries, dive into books, and, in a sense, find out for ourselves. Some of us, too, aspire to be *inventors*—to find out things which nobody has ever discovered before. It is obvious, then, that if we

[1] Milton's *Tractate on Education*, edited by Browning, p. 4.

are to be highly successful in acquiring knowledge, we must develop this self-activity. It will not be highly developed if in the early stages we are told a great deal. We shall be in danger of sinking into a state of comparative passivity, surfeited with knowledge before we have really acquired a large amount. This state begets a *blasé* condition, in which interest in things around us wanes, in which curiosity dies, and pleasure is only taken in sensual indulgence and in activities of a low and unproductive description. On the other hand, the active process whereby knowledge is acquired is highly pleasurable. We cannot help noticing this in the healthy child who is acquiring a knowledge of his surroundings. If we begin too early to tell the child many things which he can find out for himself, we weaken this self-activity, the pleasure accompanying its exercise disappears, and all interest in the acquirement of knowledge is killed.

Enough has been said to show that, even if the teacher did not aspire to be an *educator*, but were content with the more limited role of *instructor*, a full knowledge of the subjects to be taught would not be sufficient. The teacher must not only be acquainted with his subject, but *he must know his pupil*. He must know when and how much to tell, when and how far he must make arrangements for the pupil to find out for himself. And he can do this only in the light of a knowledge of child nature and its development. The practical teacher is, further, aware that all children are not alike. The deaf, dumb, and otherwise mentally defective are in these days often gathered together in special schools, where the instruction is adapted to their condition. But even the so-called normal children who attend the ordinary schools present great differences. Some of them are slightly deaf, and hear less than others. Some are short-sighted, and see less than others. Even the dullest instructor is aware of such obvious differences, and, let us hope, does his best to cope with them. But we must realise more and more that those whom we are accustomed to call "average" children possess, in addition to many common qualities, a vast number of peculiarities. The amount of knowledge they bring with them into the class-

room, their likes and dislikes, their powers of attention, of perseverance, of self-control, vary tremendously. And the good teacher will, as far as he can, take account of all these differences. How often do we hear a teacher complain of the stupidity of the children who fail to understand him! How seldom do we hear a teacher refer to his own stupidity in failing to understand the children!

So far we have confined ourselves to *instruction*. But the moment we consider the wider field of which instruction is only a part—the field of *education*—the need of a knowledge of child nature becomes even more important. Because a large part of the instruction which a child receives is obtained at school, there has always been a tendency to consider the school as essentially a centre for instruction. Teachers themselves, in spite of the cry of the great educationists that character is the main object, have always tended to fall into this error. The boys who have imbibed the most information, who get top at the examinations, are usually looked upon by the master as the best proof of his efficiency as a teacher. And this in spite of the fact that the tests of after life often make a totally different classification.

It must not be thought that we wish to belittle knowledge. Indeed, the good character or moral perfection to which reference has just been made cannot be attained without knowledge. A few philosophers, such as Socrates in olden times and Herbart (to some extent) in these days, have even gone to the point of maintaining that morality is an affair of knowledge, and that the bad man errs because he is ignorant. Without going to these lengths, we may agree that often—

> "Evil is wrought by want of thought,
> As well as want of heart."

One reason why the so-called "practical" teacher is apt to sneer, at any rate in private, at the mention of such things as "moral conduct" or "behaviour" as the chief ends of education is that he interprets these words in a narrow sense. He thinks of them as covering only a small portion of our activities. But "behaviour" in the widest

sense includes the whole conduct of life. In the case of the teacher, for instance, it includes the way in which lessons are given, how difficult boys are dealt with, how leisure is occupied. In the case of the commercial man it includes the way in which he conducts his business as well as the manner in which he brings up his children and prepares them to take their parts in life. With this wider view, it is obvious not only that much knowledge is necessary for good behaviour, but that the latter is the end, the former only one of the means. Knowledge, however, does not lose by this subordination. It rather gains in importance. And the familiar maxim, "Knowledge is power," attains a new significance. At the same time it must be remembered that knowledge is power only when it can be applied, only when it enables a man to grapple successfully with his environment. A knowledge of heraldry is of no use to a rat-catcher, though an acquaintance with the habits of rats certainly is.

The information which the teacher imparts to the pupil is considered necessary for his education; it is deemed to be part of "that which fits a man to perform justly, skilfully and magnanimously, all the offices both private and publick of Peace and War."[1] But it is only a part. How great is the number of men who are forced to admit: *video meliora proboque, deteriora sequor!*[2] Some scoundrels have been men of learning, men to whom knowledge was power. But unfortunately their power was turned to bad ends. While, therefore, knowledge is a necessary constituent of the good character, much more is required. Good habits and tendencies must have been harmoniously developed so that the individual not only knows the right course, *but chooses it.* Now the child comes to us with certain tendencies and habits already more or less strongly developed. If we are to suppress the undesirable ones, to develop still further the good ones, and to originate others, we must know as much as can be learned of the laws according to which these tendencies and habits grow. In

[1] Milton's *Tractate*, p. 8.

[2] "I see the better things and approve of them, yet I follow the worse."

this field, once again, there are great differences among children—many of them innate, some due to home education. And the teacher who wishes to be an efficient *educator* must not only be acquainted with the general laws of child nature, so far as they are known, but must make as careful a study as circumstances permit of the individual peculiarities of each pupil: "Commencez donc par mieux étudier vos élèves; car très assurément vous ne les connaissez point."[1]

Rousseau was one of the first educationists to emphasise the need of studying our children. Since his time there has grown up a special branch of investigation which is usually known as *child study*. It concerns itself with child nature in all its aspects—with the child's body as well as with his mind. The mental characteristics of the children are of more importance to the teacher than the physical (though, as we shall see, they cannot be considered entirely apart from the latter). Child study, therefore, to the teacher is, before everything else, a study of the child mind. All good teachers, from time immemorial, have attacked this subject in more or less determined fashion. The intelligent and enthusiastic teacher who is in the company of children during five or six hours each day cannot fail to find out a good deal about them, both in the way of general truths and with respect to individual differences. Many teachers are said to have an instinctive knowledge of child nature. What is meant is that they have developed so much sympathy with their children that they come to see and feel from the point of view of their pupils, and know just how things affect them. This empirical knowledge is by no means to be despised. All teachers might well join in the prayer of the poet:—

> "Backward, turn backward, O Time in your flight,
> Make me a child again just for to-night."

Many teachers who have never studied psychology as a science are so successful in applying the more or less

[1] "Begin therefore by studying your pupils more carefully, for most certainly you do not know them at all."—(*Rousseau.*)

unscientific knowledge which they have acquired, and which perhaps they could not formulate, that they can afford to mock at those who have armed themselves with a few scientific principles, but who have failed to take a real interest in children. The ideal teacher, however, is he who has studied all that is known about the child mind and who possesses also a real interest in children and their ways; who not only knows the general principles which have been discovered, but has verified them in actual experience, in the course of which he has also become aware of the individual differences and peculiarities of the children.

This book cannot deal with all the differences and peculiarities which are to be found in children. The teacher must study these for himself by taking an interest in his pupils individually, and noting their differing responses to his treatment. We can here attempt only the task of setting forth the general principles according to which all minds work.

Now the warnings we have given with respect to trying to tell something in words which represent no first-hand experience in the child apply also to the student who reads books on psychology or on child study without any first-hand knowledge. The words may be remembered and a dim notion of what is implied by them may be obtained; but unless one has observed freely for himself, the full signification will not be appreciated. Now in observing children we only see their bodies and hear the sounds which they make; we do not see what is passing in their minds. We *infer* what is passing in their minds from the changes which take place in their bodies, and from what we hear them say. We can do this only if *we* have had similar changes in our own bodies, accompanied by similar mental states. Thus, if I see a child's mouth relaxing into a smile and his eyes shining brightly, I infer that he is pleased. I can do this because *I* have been pleased and have made similar movements. It is obvious, then, that we start from self-knowledge.

We all acquire some of this knowledge. But few of us pursue the study scientifically. When it is so pursued,

it is technically known as *introspective psychology*. A child has sufficient self-knowledge to infer that his companions are pleased, pained, or indifferent. But he is not naturally given to looking within. Introspection of a serious kind is only possible to adults, and, even among them, only to the more intelligent. If, then, we are to make any effective study of psychology, we must begin with ourselves. And we begin with ourselves *as we are now*. We can, it is true, get some knowledge of ourselves as children. If we are not very old, and have good memories, we can recall some events of our past life with considerable vividness and correctness. If we can recover some of the childish letters we wrote, if we can get our fathers and mothers, our aunts and uncles, to describe us as we were, we may obtain some conception of how we thought and acted as children. But much is irrevocably gone. Since we could not introspect thoroughly then, we certainly cannot recover any important results of introspection now.

Even, therefore, in the task of understanding our past selves, we are driven back in large measure to an interpretation in which our present selves must serve as the basis. This is usually summed up by saying that child study on its mental side can be seriously undertaken only after a course in introspective (adult) psychology. Another name for this latter subject is *analytic psychology*. It is so called because in introspection we attempt to analyse the contents of our minds. Child study, in so far as it deals with the minds of the children, sets out not merely to discover the contents of a child's mind at any given moment, but to trace the process of development to the adult stage. It attempts to frame a history of the growth of mind from birth to maturity. This branch of child study is therefore often referred to as *genetic psychology*.

Though we must *start* with analytic psychology, it is not to be supposed that our genetic psychology is entirely based upon our introspection. One of the greatest mistakes that could be made would be to consider children as adults on a small scale. They are widely different. Children probably do not think and feel exactly like adults, even when they give vent to very similar

expressions and perform almost identical acts. But if we are to understand them at all, we must begin with some knowledge of mental phenomena, and we can only get this by looking within. When we have this preliminary knowledge, we must use it with caution. The mental states of the child are probably like ours, but much more simple. In trying to infer what is passing in their minds, we may well remember a caution enunciated by Lloyd Morgan as a principle to be observed in studying animal intelligence—never to suppose a more complicated mental state than is necessary to account for the actions observed.

Questions on Chapter I.

1. What do you understand by *education* and *instruction*, and what are the relations between them?

2. Has a teacher any right to complain that a child is stupid? Give full reasons for your answer.

3. How is it that some teachers are very successful without a knowledge of scientific psychology?

4. How could you prove that children do not think and feel exactly like adults?

5. What grounds can you advance in support of the assertion that children think and feel in a manner similar to your own?

6. Distinguish between *analytic* and *genetic* psychology. How far is the latter dependent on the former?

7. Why is it not advisable, even when possible, to give full replies to all children's questions?

8. Mention some dangers attendant upon instruction which is carried on only by oral lessons.

9. What was the advantage of the method of setting individual tasks without any oral lessons, as pursued in the old grammar schools? What were the disadvantages?

10. Give examples of things that can be told to a boy of eight, and of others that cannot.

CHAPTER II.

Mind and Body.

Psychology is the study of mental phenomena. But the mind is so intimately connected with the body that we cannot afford to neglect entirely some consideration of the latter, even when our chief interest is in the former. Of the exact nature of this connection between mind and body we can say nothing with certainty, except that it is an extremely close one. So close is it that even the most philosophical are often betrayed into language which substitutes the physical for the mental. The word *brain* is often used for *intelligence*, as, for instance, when we say that a person has "plenty of brains." But the thoughts which take place in the person's mind, and which constitute his intelligence, are not material things. True, they could not, as far as we know, take place without the brain. In order that they may occur it is necessary that the brain should be in a certain state of activity. But they are not to be identified with the brain. All we can say is that every mental state implies a corresponding brain state. For a mental state to occur, the brain must be more or less suffused with blood, and certain changes must be taking place in the nervous tissue of which it is composed. Conversely, we can probably say that, given a certain state of the brain, in which blood is circulating in it, or at any rate in a part of it, and in which certain specific changes (of which we shall say more later) are taking place in the nervous tissue, a mental state arises. Not that there is a mental state corresponding to *every* brain state. In deep sleep, when little blood circulates in

the head, and when the nervous changes which take place in the brain are different from those occurring during the time when we are awake, any mental states which may occur are so slight that they are imperceptible.

We shall presently go on to describe the brain. But, even before this is done, the reader is quite clear as to the general nature of this most important part of the body. Merely to know that it is a whitish substance in the head will suffice for the moment.

But one may well ask: What is this mind, with which the brain is said to be connected, and what are those mental states which arise when certain brain-changes take place? In answer to this question we can only refer the reader to his own consciousness. If he is to know any mind at first hand, it must be his own. By *mind* we mean what is sometimes referred to as the *soul*, the *spirit*, the *ego*, the *self*. These terms are sometimes used with differing meanings, but they all refer with more or less definiteness to the subject, which in the case of each of us passes through, or possesses, for a longer or shorter period, those different phases which are termed perceptions, thoughts, feelings, desires, wishes, emotions, and so forth. It is these phases which are summed up under the terms *mental states*, *mental phenomena*, or *mental processes*.[1] These can only be directly experienced by the subject whose phases they are. Each of us is quite certain of having such mental states. They are, as we have already said, not material things. They have, for instance, no weight. Indeed, it seems absurd to think of them in such a way. And it seems equally absurd to think of the mind of which they are the phases or experiences as capable of possessing such material attributes.

We have, then, a sufficient idea of what is meant by a mental state. But although we talk glibly about the mind of which mental states are phases, we find ourselves at a loss when asked to form a clear-cut conception of it. Every man feels certain that he has, or better still that he *is*, a *mind* or *ego*. But when asked to state exactly what he means by these terms, he is perplexed, and can only reply

[1] The word *psychical* is often used instead of *mental*.

by other terms which make the thing to be defined no clearer. He may perhaps say "myself," "I," or "I myself." But however positive he may feel that this is what he is most certain of, he can make the thing no clearer, even to himself. Hume, one of the greatest of English philosophers, came to the conclusion that the mind is nothing beyond the thoughts, feelings, desires, and so forth, which we have been referring to as its states, or manifestations.

"For my part," he writes, "when I enter most intimately into what I call *myself*, I always stumble on some particular perception or other of heat or cold, light or shade, love or hatred, pain or pleasure. I never catch *myself* at any time without a perception, and never can observe anything but the perception. When my perceptions are removed for any time, as by sound sleep, so long am I insensible of *myself*, and may truly be said not to exist. And were all my perceptions removed by death, and could I neither think, nor feel, nor see, nor love, nor hate after the dissolution of my body, I should be entirely annihilated, nor do I conceive what is farther requisite to make me a perfect non-entity. If anyone, upon serious and unprejudiced reflection, thinks he has a different notion of *himself*, I must confess I can reason no longer with him. All I can allow him is, that he may be in the right as well as I, and that we are essentially different in this particular. He may, perhaps, perceive something simple and continued which he calls himself; though I am certain there is no such principle in me.

"But setting aside some metaphysicians of this kind, I may venture to affirm of the rest of mankind that they are *nothing but a bundle or collection of different perceptions*, which succeed each other with an inconceivable rapidity, and are in a perpetual flux and movement."[1]

In spite of this, each of us continues to talk of his mind as something over and above the thoughts, feelings, and desires, which come and go.

The problem as to what the mind or ego really is can be left to the philosophers or metaphysicians. To the end of

[1] Hume, *Treatise on Human Nature*, Chapter on Personal Identity.

time they will probably continue to discuss it. Although psychology is often referred to as the science of *mind*, it does *not* concern itself with such speculations as those just indicated. It is the science of *conscious states or processes.* Of these, as we have already noted, we all have a sufficient idea. Psychology aspires to distinguish these various mental processes (or *psychoses*, as they are often termed) and to classify them. It then goes on to trace the way in which they develop, and the connections which either exist from the first or which are later formed between them.

As we have said, these mental states are always accompanied by certain brain-changes. If we wish, therefore, to learn as much as possible of the way in which they develop, we must know something of the brain, its structure, and functions.

The brain is a mass of nerve tissue situated in, and protected by, the skull. It may roughly be divided into two parts—(1) the *cerebrum*, forming the larger and upper part, and (2) a group of inferior organs consisting of the *cerebellum*, or little brain, (below and behind the cerebrum,) a number of smaller masses known as *basal ganglia* (also below the cerebrum, but further forward), and the *medulla oblongata*, a rounded prolongation leading downwards from cerebrum and cerebellum, and continued below as the *spinal cord*, which last, however, is not usually included as part of the brain.

The cerebrum is divided vertically from front to back into two halves or *cerebral hemispheres*. These are joined at the base by a flattened sheet of nervous tissue called the *corpus callosum*. The surface of each hemisphere presents numerous folds or convolutions. The whole cerebrum is, therefore, very similar in appearance to the kernel of a walnut. The clefts or fissures which separate these convolutions are called *sulci*. Two of these clefts are deeper and longer than the others; one proceeds from the top downwards and forwards and is known as the *fissure of Rolando*, the other proceeds from the bottom, upwards and backwards, and is known as the *fissure of Sylvius*. These great clefts divide each hemisphere up into four somewhat clearly marked sections. The front portion is called the

frontal lobe, the middle portion the *parietal lobe*, the extreme back portion the *occipital lobe*, while that part of the back portion which is further to the front (and side), immediately below and behind the fissure of Sylvius, is known as the *temporal* lobe.

The cerebellum is divided into two *cerebellar hemispheres*. Its surface presents many narrow convolutions which are roughly horizontal in direction.

The *medulla oblongata*, which is almost vertical, is also divided almost in two. There are two longitudinal clefts, one in the front and one behind. The *spinal cord* is similarly divided.

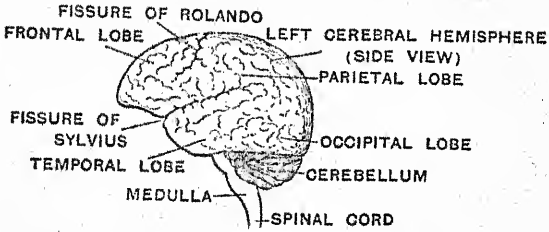


Fig. 1.—The Human Brain.—Rough Sketch to show Parts.

The smaller *basal ganglia* are too complicated for detailed description in an elementary book. Some indication of them is shown in the accompanying sketch of the brain seen from below (Fig. 3).

Examination of a section of the brain shows that it is composed of both white and grey matter. In the cerebrum the grey matter forms an outer layer, and is called the *cortex*, or *cortex cerebri* (Fig. 4). In the cerebellum the grey matter is also outside, but extends further inwards; the white matter in section presents a peculiar tree-like appearance. In the medulla oblongata, and also in the spinal cord, which is its prolongation, the grey matter is in the interior (Fig. 5). Microscopic examination of nervous tissue reveals the fact that the grey matter consists of *nerve-cells* or *neurones*, while the white matter consists of very thin *nerve-fibres*. But the two are not

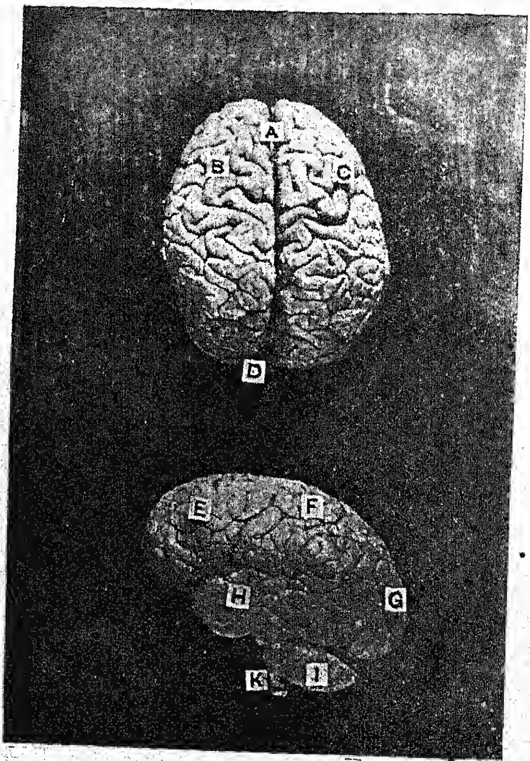


Fig. 2.—The Human Brain.

The upper one represents the view from the top; the lower from the left side.

A is placed in the great longitudinal fissure which separates *B* and *C*, the two cerebral hemispheres.

D, the cerebellum. *E*, frontal lobe. *F*, parietal lobe.
G, occipital lobe. *H*, temporal lobe. *I*, cerebellum.
K, medulla oblongata, passing into the spinal cord.

distinct. Each nerve-fibre is really part of a nerve-cell, being a prolongation of it. Each nerve-cell usually has

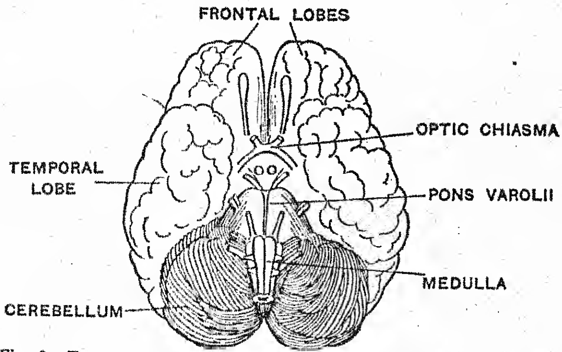


Fig. 3.—The Brain from below (Cord and many Issuing Nerves are seen cut).

several prolongations. One of these prolongations is sometimes very long, and is known as the *axon*. Many of the axons proceed to different parts of the body, and some

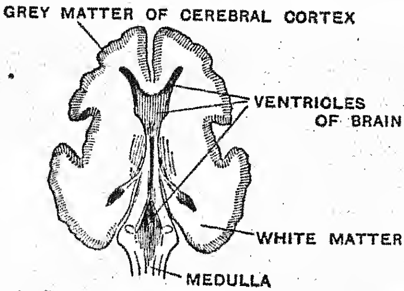


Fig. 4.—Section through the Cerebral Hemispheres.

are very long indeed. Those, for instance, which run from the spinal cord to the toes are several feet in length.

A large number of axons running in one direction, ultimately to be separated and to be distributed over a

certain area, are bound together and can be seen by the naked eye as a white string or cord. This is called a *nerve.* Some axons give off a number of branches which connect one neurone with another, though there does not seem to be absolute continuity of nervous tissue at such points. These branchings are often called *arborisations,*

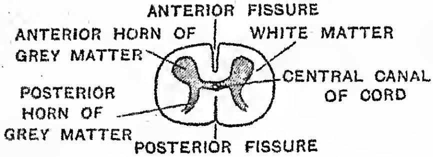


Fig. 5.—TRANSVERSE SECTION OF THE SPINAL CORD.

and the junctions between neurones which are formed by them are known as *synapses.* Similar arborisations occur at the ends of those axons which reach distant portions of the body, the terminal fibres dividing into a fine network, and passing, for instance, into a muscle, or ramifying in some characteristic fashion among the cells of the skin,

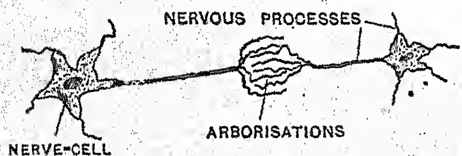


Fig. 6.—NERVE-CELLS OR NEURONES.

either of the external parts of the body or of the internal organs. The shorter processes of the neurones divide up into many very fine branches. They probably also connect cell with cell.

It is impossible to follow out in detail the multitudinous ramifications of the nerve-cells and fibres. It is necessary, however, to have some slight idea of the way in which the nervous system acts. Every part of each neurone is "irritable," *i.e.* is capable of responding—probably by

a chemical change—to some form of external energy called a *stimulus.* The change thus produced initiates a *nervous impulse* or *excitation.* Of the nature of this impulse little is known. Some have thought it is a purely physical change like the conduction of electricity in a wire, though its rate of transmission is much slower than that of electricity. It is possible, however, that chemical changes are involved. Probably the passage of the nervous impulse is like the series of combustions which take place along the track of a fuse of gunpowder. The process of excitation liberates energy which was stored up in the cell. This liberated energy is transmitted to other cells. These may be either other neurones of the nervous system or the contractile cells constituting a muscle. In the former case, the energy may be transmitted from neurone to neurone and, if it fails to reach one which is connected by its axon with a muscle-fibre, it will gradually expend itself in producing changes in the condition of the nervous tissue. In the latter case, however, some form of muscular activity will be produced. The muscles are the organs of the body which, by their contraction, produce movement. They can only do this when excited to activity by the nervous impulses reaching the muscular cells (or *muscular fibres,* as they are often called) along the axons. A bundle of such axons leading to a muscle is called a *motor nerve.* All muscles are supplied with motor nerves.

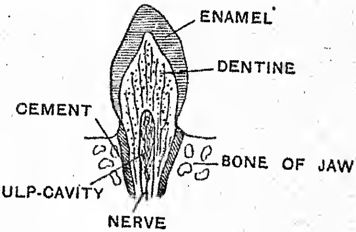


Fig. 7.—Section of Tooth to show Nerve.

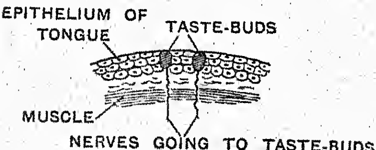


Fig. 8.—Section of small portion of Tongue (highly magnified).

We have up to the present supposed a nervous impulse to be already in existence, and we have noted how it will find its way from neurone to neurone, and in many cases pass out of the nervous system to a muscle. We have

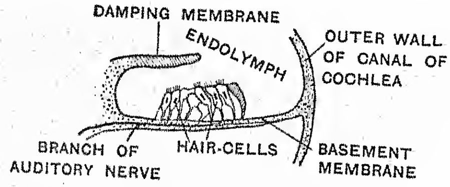


Fig. 9.—Section of part of the Inner Ear (highly magnified to show Nerve Ending.

not yet explained how nervous impulses usually come into existence within the nervous system. Nor have we shown why they do not spread in any direction, reaching, for example, the pulp of a tooth, or the cells of the skin in

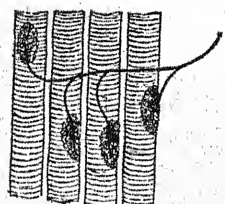


Fig. 10.—Nerve Endings in Muscular Fibres (very highly magnified; diagrammatic).

some other external or internal part of the body. For there are axons or nerve-fibres proceeding not only to muscles, but to all those surfaces, whether internal or external, which may be called "skin." The word "skin"

is here used in a very wide sense. The teeth, the eye and the ear, for instance, must be considered as peculiar modifications of the skin. It is believed that they are organs which have gradually been developed, in the course of long ages of evolution, from one simple covering of the body.

It is in the "skin" that normal excitations take their rise. The simplest case is that in which something touches the external skin. It cannot directly touch the nerve endings; for these do not reach to the surface. But it affects the ordinary cells of the skin, and these in turn produce an excitation in the nerve-fibres adjacent to them. This excitation or impulse can only proceed along the nerve in one direction; for at this point, since we are at the end of a nerve-fibre, it is only inwards, towards the cell body (which may be at a great distance), that the excitation can proceed. A bundle of nerve-fibres proceeding from the "skin" of any portion of the body, and capable of carrying excitations inwards, is called a *sensory nerve.*

Usually there is not one excitation passing along one fibre, but a number of impulses passing along a number of parallel fibres. And it is not one cell-body to which transmissions take place, but a number. A group of such cell-bodies is known as a nerve-centre. All groups of cell-bodies receive this name whether they are those which are in immediate connection with the fibres coming from the skin or those from which fibres pass to muscles. But in the former case they are known as *sensory centres*; and in the latter, as *motor centres.* There are such centres both in the brain and in the spinal cord. The nerves which proceed from some portion of the skin to a sensory centre are called *afferent* (or *sensory*) *nerves.* Those which proceed from a motor-centre to a muscle are called *efferent* (or *motor*) *nerves.*

We have seen that an impulse initiated at the skin has only one direction in which to travel—towards a sensory centre. But there seems no reason why, if a motor-nerve were stimulated, the excitation should not pass backwards to the motor-centre as well as forwards to the muscle. It may be that the impulse can be conducted

through the substance of the neurone equally well in all directions. But, as we have seen, there comes a point where connection with another neurone is made by means of a synapse. At such points there appears to be opposition to transmission of excitation in the direction motor-sensory. The synapses appear to act like valves, rendering conduction from the efferent or motor side of the nervous system to the afferent or sensory side very difficult. Nervous energy tends, therefore, to flow uniformly towards the motor side, *i.e.* towards the muscles. This fact is often referred to as the *law of forward conduction.* The whole nervous system may, indeed, be looked upon as a multitudinous collection of arcs of nerve tissue conducting impulses initiated in the "skin" through nerve-centres towards the muscles.

In the cerebrum the complication of nerve-centres is very great. In the basal ganglia it is also considerable. It is simplest in the spinal cord. We shall find that the arcs referred to are not separate, but connected in most complicated fashion. For the sake of clearness, however, it is well to sketch briefly the simplest form of arc, forgetting for the moment any other connections into which it enters. Such an arc is to be found repeated over and over again in the spinal cord. It would consist of (1) a sensory fibre coming from some portion of the skin; (2) the nerve-cell of which this sensory fibre is a prolongation; and, connected with the sensory cell, (3) a motor cell with (4) a motor fibre passing to a muscle. If a stimulus be applied to the portion of the skin in question, an excitation is aroused in the sensory nerve-fibre. This excitation spreads rapidly throughout the neurone, is transmitted across the synapse to the motor neurone, ultimately reaches the muscle, which is caused to contract, and movement occurs. Movements caused in this simple way are called *reflex actions.* They may occur without any consciousness. Many of such movements can occur while the individual is in a deep sleep, *e.g.* the movements of the leg when the sole of the foot is scratched.

Large numbers of such arcs as those just described occur together. But the arrangement is not so simple as

we have sketched it. In the first place, the spinal cord consists of two halves, and each half has its arcs (for each side of the body). Further, the motor and sensory nerves, though carrying impulses in different directions, are bound up together until they approach close to the cord. Here they divide, the sensory nerve (after swelling out into what is called the *posterior root ganglion*) entering its half of the cord at the back, the motor entering (we might say *coming out*, if we remember the direction of its impulses) at the front. Since the same occurs with respect to the other half of the cord, we thus get a pair of nerves (each with two roots and each consisting of both motor and sensory fibres) springing from the cord (Fig. 11).

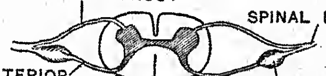


Fig. 11. - SPINAL NERVES ISSUING FROM CORD.

Each pair issues from the spinal cord through the small hole between the bones. There are 31 such pairs.

The brain gives off from its under surface twelve similar pairs of nerves. These are called the *cranial nerves* (see Fig. 3).

The *first pair*, counting from before backwards, are the *olfactory nerves*, or the nerves of smell. These are *sensory* or *afferent* nerves, the fibres of which bring impulses from the lining of the nose.

The *second pair* are the *sensory* nerves of the eye or the *optic nerves*. They enter at the back of the eye, and spread out into a delicate and complicated layer of nervous tissue called the *retina*.

The *third pair* are called the *motores oculi*. They are distributed to some of the muscles which move the eye-balls.

The *fourth pair* are also motor nerves, each of which supplies one of the eye muscles.

The *fifth pair* are very large and contain both motor

and sensory fibres. Each divides into three branches and they are consequently called the *trigeminal nerves*. They supply the skin of the face, the muscles of the lower jaw and the tongue. One branch of each trigeminal nerve supplies the fore-part of the tongue with sensory fibres, and is often called the *gustatory*.

The *sixth pair* are small. Each supplies one muscle of the eye—the one which turns the eye-ball outwards.

The *seventh pair* are called *facial nerves*. They are *motor* nerves which supply the muscles of the face and some other muscles.

The *eighth pair* are the *auditory nerves*—the sensory nerves which bring excitations originating in the ear.

The *ninth pair*, called the *glossopharyngeal*, are mixed nerves. Their sensory fibres enable us to taste, while the *motor* fibres supply the muscles of the pharynx (the cavity behind the mouth).

The *tenth pair* are termed *pneumogastric nerves*. They are important *mixed* nerves which send fibres to the larynx, the lungs, the liver, the stomach, and the heart.

The *eleventh pair* are *motor* nerves which supply certain muscles of the neck.

The *twelfth pair* are *motor* nerves supplying fibres to the muscles of the tongue.

Arcs similar to those already described in dealing with the spinal cord occur in connection with the cranial nerves. All such simple arcs, whether in the spinal cord itself or in the higher regions to which we have been referring, are called arcs of the spinal level, and the movements produced by their sole agency are called *reflex actions*.

There are, besides those already mentioned, other nerve-centres in different parts of the body, *e.g.* in the heart and stomach, and also in parallel chains on each side of the spine. These are to some extent connected with the system which we have already described. But they act to a large extent independently, controlling a vast number of reflex actions or involuntary movements within the body. In this way, for instance, they regulate the supply of blood to the various parts of the body. This system is known as the *sympathetic system*, to distinguish it

from the one which has been previously described, and which is known as the *central nervous system* or the *cerebro-spinal system.*

Returning now to the central nervous system, we must note that only its lower arcs have been dealt with. But the brain consists principally of higher nerve-centres. These are, however, connected with the lower centres. The afferent or sensory paths, besides helping to form the arcs of the spinal level, are continued upwards to the cerebrum. The axons which serve this purpose in the cord proceed upwards, giving off branches to other centres as they go, and at the top they make junctions with other long neurones, which *cross over* from one side to the other (from the left side to the right or *vice versa*) and passing through the basal ganglia ultimately reach the cortex of the cerebrum on the opposite side from that in which they originated. Each cerebral hemisphere is thus connected by afferent nerves with the sense organs of the opposite side of the body.

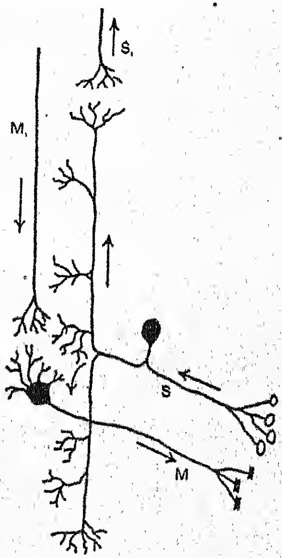


Fig. 12.—DIAGRAM SHOWING ARRANGEMENT OF NEURONES IN SPINAL CENTRE.

S, Sensory Neurone; *S*,, Conduction Path to Higher Centres; *M*, Motor Neurone; *M*,, Conduction Path from Higher Centres. (*S* and *M* would in many cases be very long.)

The parts of the cortex to which these afferent nerves lead are known as *sensory areas.* In these areas of grey matter, afferent neurones are connected by longer or shorter chains of small neurones with other and efferent neurones whose fibres pass down and join the various motor mechanisms of the spinal level. We thus have sensori-motor arcs of what is called the *intermediate level.*

They consist of long loops upon the sensori-motor arcs of the spinal level. An impulse, instead of passing completely through the lower arc, may be deflected, in whole or in part, through the intermediate level of the cortex. If this occurs, that form of consciousness which is known as *sensation* arises.[1] Automatic movements still occur. But they are now to be termed *sensation-reflexes.* To take an instance, while I am writing a fly may pass close to my eye, causing me to blink. I may pay no definite attention to the fly, and I certainly do not make up my mind to blink. The whole takes place mechanically. Other examples of such sensation-reflexes are sneezing, the cough provoked by irritation in the throat, the turning of the eyes and head towards any bright flash of light, or of the face towards the source of a sudden loud noise.

Some writers would prefer to call such movements as these last by the name of *instinctive actions.* But this term is usually applied to more complex cases which involve as a necessary constituent enough consciousness to include definite perception of the object, some emotional excitement at the perception of it, and the tendency to adopt a certain general attitude and line of action towards it. All this, however, need not include any understanding of the end of the actions, still less any definite desire for that end; the animal or person simply feels moved to do certain things. Thus a spider perceives a fly in his web, and runs to attack him. This would be a case of instinctive action in the strict sense. It is somewhat difficult to draw the line between reflex action and instinctive action.[2] Kirkpatrick distinguishes them as follows: "Where the

[1] Until quite lately it was held by most authorities that no form of consciousness can occur unless some part of the *cortex* is excited. But recent researches seem to indicate that some sensations may arise before an afferent impulse reaches the cortex, though not before it reaches certain synapses in the *basal ganglia* of the brain. (It is thought that consciousness arises only in connection with the passage of an impulse across synapses, either in this place or in the cortex, but more especially in the latter.)

[2] Some writers (*e.g.* Spencer) refuse to make any clear distinction, and call all instinctive actions compound reflexes.

reaction is of a part of the organism only, it is more properly called a reflex; while more complex reactions of many parts for the good of the whole organism are designated as instincts."[1] These instincts will be dealt with more fully in later chapters. Meanwhile it is well to point out that on the neural side instinctive actions involve *some* of the still higher arcs which we now proceed to study.

There are, then, still higher centres. These, with their fibres, constitute what are called *arcs of the third level.* They are not higher with respect to *altitude*—since those of the intermediate level are already in the cortex, and there is nothing above that. They are, indeed, distributed over various areas of the cortex not occupied by the cells of the intermediate level. They are, however, higher in *function.* They consist of neurones which form arcs related to those of the intermediate level in a way similar to that in which these are related to those of the spinal level. It is in connection with the functioning of the arcs of the third level that the higher and more definite forms of consciousness arise—such processes as perception, imagination, and conception (of which we shall treat later). It is probable that among these higher centres there exist many different levels corresponding to the various degrees of understanding and attainment. Unlike the arcs of the lower levels, these arcs are not ready-made to any large extent in man at the beginning of life.[2] They go on developing almost throughout life and they develop in different ways according to the experiences of individuals. They are the parts of the brain most intimately connected with *learning by experience*, the capacity for which is possessed in a high degree only by man. It is not surprising, then,

[1] *Genetic Psychology*, pp. 92, 93.

[2] In so far as they are "ready-made" they form the neural basis of instincts. Man has indeed a large share of these. But they do not form so large a proportion of the whole, nor are they so perfectly ready-made, as in the case of many of the other animals. Further, many of them, though they may be called "ready-made," are not in this state immediately, or very soon, after birth; but develop as growth proceeds—like the teeth or the beard—often after many years of life.

that these parts of the brain are very rudimentary in the lower animals.[1]

The paths taken by an impulse which rises above an arc of the spinal level may be almost infinitely various; for the neurones of the higher levels are connected in very many different ways, especially in the case of arcs of the third level. These connections are continually being modified in the course of, and by reason of, experience. We may liken the higher levels to the central office of a telephone system. A message coming in from one house may be directed along each of a large number of wires. So a given stimulus may give rise to an excitation which, if it is deflected to the higher loops, may produce any one of an immense variety of results. It is not, of course, meant that the whole affair is a matter of chance. Strictly speaking, there is no such thing as chance. What is meant is that, on account of the large number of connections which exist in the cortex, many tracts can be pursued, though at any given moment the path actually taken is determined by the conditions existing at that moment, so that there would be no chance in the matter at all to one who could know the whole of the conditions.

It is impossible to go further into details here. The structure and functioning of the brain is not yet completely understood, though many brilliant scientists have devoted their lives to this department of physiology. Sufficient has been said to show that consciousness is intimately connected with physiological processes taking place in the cells of the grey matter in the cortex of the cerebrum.

A few additional facts will perhaps further emphasise our conclusions. Injury to portions of the cortex usually leads to loss of mental power. Thus in *aphasia*, or loss of speech, certain areas of the cortex are frequently found to have been affected. Further, it has been demonstrated that, whenever there is great mental activity there is increased circulation of blood in the brain, and the waste

[1] They are rudimentary in the sense that they consist very largely of the ready-made arcs connected with instincts, and possess little space for complex modifications of these.

products carried away by the blood are greater. If the blood-supply to the brain is interrupted, loss of consciousness at once occurs. Like the muscles and other portions of the body, the brain can only continue its activity if it is supplied with pure blood, to provide oxygen for the "burning," to renew the tissues which are decomposed, and to carry away the products of the decomposition.

The well-worn motto *mens sana in corpore sano* assumes, therefore, very great importance. The pure blood necessary for the nervous system (as well as for other parts of the body) can only be produced if the body is kept healthy. Under normal circumstances, good food and fresh air are the chief essentials. But even with a good supply of these, there is a further danger. It takes time for worn tissue to be repaired and for waste products to be removed. If activity goes on too continuously, wearing-out exceeds repair, the blood and tissues become clogged with waste products which are poisonous, and the efficiency of the whole system is decreased. Such a state is known as *fatigue*. It is called *muscular fatigue* when excessive activity of the muscles is the cause; and *nervous fatigue* when the activity of the nervous system has been unduly continued. Since the latter kind affects consciousness—which is a concomitant of certain brain-activities—it is often referred to as *mental fatigue*. We use the adjective *mental* when we are referring to the impaired activities of *consciousness*, to loss of power in concentrating attention; we employ the term *nervous* when we are alluding to the *physical* basis of consciousness, to the unsatisfactory state of the brain tissue.

Rest, therefore, must be given at frequent intervals. Change of activity will often do much, especially when the change is from close mental work to light bodily work involving little thought. For it involves a shifting of the point at which wear is taking place. But if the blood is highly charged with waste products, it is dangerous to change to any other activity; for only poisoned blood can come to the new tissue which is exercised. Fatigue indeed tends to spread by means of the blood. Thus, muscular fatigue may induce nervous fatigue. After a

hard game of football, a boy is not in a condition to attack serious mental work. If the signs of fatigue are ignored, serious harm may be done. In extreme cases, death may occur—death from poison! "The hunted hare run to death dies . . . because a poisoned blood poisons his brain, poisons his whole body" (Sir M. Foster).

Questions on Chapter II.

1. Mention some of the most important conclusions of physiology with reference to the relation of body and mind. Deduce therefrom some rules for your guidance in the class-room.

2. What is *reflex action*? Give examples. How is it that a man in a fit, though quite unconscious, may go on breathing regularly?

3. Explain what is meant by a *sensation-reflex*, giving examples.

4. Man is capable of an immensely greater number of responses to his environment than any lower animals. Indicate briefly the differences in the structure of his nervous system which render this superiority possible.

5. "All work and no play makes Jack a dull boy." Give scientific grounds for this statement.

6. What do you understand by *mental fatigue*? How does it differ from *muscular fatigue*? Is there any connection between the two?

7. Supposing that a class of boys had a drawing lesson at a certain time one day, and a lesson in gymnastics at the same time on the next day, after which of these exercises could a difficult lesson in arithmetic be the more satisfactorily placed? Give reasons for your answer.

CHAPTER III.

Preliminary Analysis of Mental Phenomena.

In view of the fact that all mental processes are accompanied by processes in the nervous system, it is obvious that a complete knowledge of the latter, its method of functioning and development, would throw much light on the way in which mental processes arise. But our knowledge of the nervous system is still in a rudimentary state. Although it does throw considerable light on the problem of the genesis and development of mental phenomena, we find that the examination of mental states, in and for themselves, has in many cases proceeded without any definite knowledge of the nervous processes which are involved. We have gained much of our knowledge of mental processes solely by introspection. To take an example, we find ourselves dwelling on thoughts which give us pleasure and striving to be rid of those which give us pain. But we have no knowledge of the nervous processes which are involved in either pleasure or pain. We are quite convinced of certain facts on the mental side, though we have no idea of what their nervous concomitants may be. We have, therefore, frequently to carry on introspective psychology with little help from the field of physiology. In some cases, indeed, our introspective results have thrown light on the problems of physiology, guiding the physiologists in their investigations of nervous processes.

It is necessary, then, to depend a great deal on introspection. And it is well, at the outset, to attempt

a survey of the whole field of mental processes, in order to distinguish their chief characteristics.

As long as we are awake, some of these mental processes are taking place. As long as we are awake, we are aware, or conscious, or cognisant, of certain things. If we were not, we should not be awake. The things of which we are cognisant at different moments of our existence are of very different kinds. Sitting in my room, I may be at one time conscious of the pen in my hand and of myself writing. I am attempting to write on psychology, and at times the ideas connected with the subject may so engross me that for the moment I am not clearly cognisant either of the pen in my hand or of myself as writing. I may turn to a book by my side, read a sentence in it, and concentrate my attention on the meaning of that sentence. A minute later, the noise of a passing cart disturbs me, and for a brief instant psychology and writing are forgotten while I look out from the window. I may lean back in my chair for a moment, and reflect on the difficulty of this subject. I may light my pipe and take a rest. I may even begin to doze off. But as long as I am to any extent awake, I am cognisant of *something*. All mental states, then, involve this cognisance. Of whatever kind the thing or things may be to which I attend, it is usual to speak of it or them as the *object*. Used in this way, the word does not merely refer to anything which can be seen or handled. It refers to *anything which can be attended to.* Although, when used in this sense, it is almost always written in the singular, what is designated by it may be a number of things.

One characteristic, then, of all our mental states is that they involve cognisance of an object. This aspect or characteristic is referred to by psychologists in various terms. The chief are *cognition* and *knowing*. Whatever other characteristics a mental process may have, it always involves the *cognition* or *knowing* of an *object*.

Reverting to the examples of conscious states which have been cited, we may notice a second characteristic. When I lean back in my chair and reflect upon the difficulty of psychology, I am pained. When I light my pipe and

take a rest, I experience pleasure. Pleasure and pain are clearly present in these cases. It is impossible for me to describe these feelings to you. If you had not experienced them yourself under some circumstances, you could not appreciate what I am referring to. It is not necessary for you to have reflected on the difficulty of psychology, or to have smoked a pipe. You have, however, experienced the same kind of feeling in connection with other mental states.

You may, during last summer, have drunk a cool glass of lemonade when you were hot and tired after a long walk in the sun. Towards the end of your walk you were fatigued. As you toiled on in the hot sun, you were certainly not in a pleasant state. It may be that the thought of a rest and of refreshment arose from time to time. This was to some extent pleasant. But the sensations involved in trudging on in the heat were distinctly disagreeable. The draught of cool lemonade at the end was highly pleasurable—a good deal more so than the mere thought of it during the walk. You have no doubt passed through innumerable states during which you have experienced some of this *pleasure* and *pain*.

These states were widely different in other respects. But they were all alike in one way, in the fact of their being either agreeable or disagreeable. This characteristic of mental states is called by psychologists their *feeling-tone*. Other words often employed to designate it are *hedonic tone*, *affection*, *pleasure-pain* (used as a compound to signify one or the other). The word *feeling* is often used by itself to indicate the same thing. But the student must remember that this word is used, even in psychology, with many other meanings. Of these we shall speak later. The word *affection* has also a very different meaning in ordinary speech. *Feeling-tone* is perhaps the safest term to use, for although *feeling* often means other things, the addition of the word *tone* renders only our present meaning possible. *Hedonic tone* is also unequivocal; but its etymology is unfortunate: it comes from a Greek word (ἡδονή) which means *pleasure only*. There can be no ambiguity if we use the term *pleasure-*

pain. But it is likely to suggest to the beginner that there is always a compound of pleasure *and* pain, instead of one *or* the other. True, we often do have a mixture of pleasure and pain. But that is when we have a complex mental state of which certain parts are pleasurable, others disagreeable.

The reader will readily agree that many of his mental states have considerable feeling-tone. But he may probably dissent when it is asserted that some pleasure-pain is always present. Most psychologists, however, agree that every mental state is to some extent coloured by pleasure or pain. In many cases, it is true, the amount of pleasure or pain is so small that the state appears indifferent. It is only when these feelings are intense that we become aware of them. It is, further, impossible to isolate the hedonic-tone from the whole state of which it forms a part or aspect, and to attend to it by itself. For it is the way in which we are affected when we attend to *an object.* We attend to the *object,* not to the way in which it affects us. If we attempt to switch off our attention from the object to direct it upon the hedonic-tone of our state of consciousness, we have changed our mental state, and the feeling-tone is thereby modified.

In other words, when we think we are succeeding in attending, not to the object, but to the hedonic tone, we are really attending to some reduced and modified form of our original object; and there is still some hedonic tone (modified with the modified object) in the background. And if we still attempt to come to closer quarters with this hedonic tone, we only succeed in making a still more modified object, with a new feeling-tone accompanying the experience. It is this evasive character of feeling which is largely responsible for what is sometimes called the "Paradox of Hedonism"—the proverbial truth that those who seek too keenly for pleasure are in danger of missing it.

Although, however, feeling is so evasive, we shall find that it exercises a very great influence in the mental economy. To indulge in metaphor, we may say that while it is not a prominent statesman at the head of

affairs, directing and governing openly, it is a powerful 'wire-puller,' by whom the prominent statesmen are largely swayed.

Lloyd Morgan sums up the matter well when he says: 'In naïve, natural, unsophisticated experience, and especially in its earlier and simpler phases of development, the feelings, important as they are as factors in the field of consciousness as a whole, lie for the most part in the background, and do not occupy the field of attention."[1]

There remains a third aspect which all mental states possess. The late Professor James, probably the greatest of American psychologists, speaks of "the stream of thought." Like all analogies, this of a *stream* cannot be carried very far. A stream of water continues to flow, but it remains of the same composition. The stream of consciousness is for ever changing in character. But it remains a stream—it tends to *go on*. As Hobbes puts it, "there is no satisfaction but in proceeding." Our mental processes, although they are continually changing and passing into processes of a different kind, may nevertheless be marked off into fairly complete wholes. Our lives may be broken up into portions which are tolerably distinct one from another. Many of these portions extend over long periods. Some are very short. And there is much overlapping.

Thus, a student goes to college, and remains two or three years preparing for the teaching profession. This period is a fairly complete whole. Within it there are smaller units, some of them naturally connected with the greater whole, others apparently independent of it. As an example of the former, we may take the preparation and the giving of a criticism lesson. As an example of the latter, a visit to a friend. There may, of course, be overlapping periods. Thus, within this college period, a new era—more or less independent of it—may commence. The student may fall in love and become "engaged"—let us hope with no great inhibition of his

[1] *Psychology for Teachers*, New Edition p. 50.

studies. Such a course is certainly not to be recommended to a young man before he has established himself in a fairly strong position in life. But, as we shall see, many things begin, and go on, in opposition to reason. In the case supposed, the new experience may change the whole current of the student's life. It will then become connected with many other experiences, influencing and being influenced by them, and with them making up the person's life-history.

Now at a given instant our mental state is part of a whole which has begun, and which tends with more or less force of current to complete itself. As we have already indicated, there are wholes within wholes. The student may be studying a chapter to be prepared for the next psychology hour in college. His task can be considered as a whole, and it is to be hoped that the strength of the current will be strong enough to carry the business through. But this whole is part of the greater whole which includes the passing of the final examination and qualification for the profession of teaching. And the smaller whole derives more or less strength from its connection with the larger one, just as a branch grows well or badly partly on account of the stem to which it is attached, and from which it derives nourishment.

Let us take a further example from among the mental processes cited at the beginning of this chapter. When the noise of the passing cart interrupts my work, a new mental state is initiated, which tends to go on in the direction of looking out from the window and seeing what kind of vehicle is passing. This process then runs down, and the process which it had interrupted—the writing of this chapter—is able to proceed. This example illustrates how one mental process may stop or *inhibit* another. The case of the student falling in love and neglecting his studies is another instance. There are a large number of cases of this kind, and many of the disappointments of life occur because of failure to recognise that two inconsistent tendencies cannot flourish together. On the other hand, one mental process may support another. We have already noted a case in which a larger helps a smaller one

which is a part of it. As an instance of the reverse influence we may cite a teacher who ultimately came to take a deep interest in his profession, not because he chose it for himself, but because he had a liking for the study which was necessary in order to qualify himself.

Everywhere we find this tendency to proceed in some direction or other. Psychologists give it the name *conation*. Some also refer to it as *will*. But this term is also used for complex mental states or conditions, which, though they depend very largely on conation, are not to be identified with it. The word *striving* has also been frequently used as synonymous with conation. But it is probably better to reserve that word for special cases. Conation may often be very strong when, at any rate according to the ordinary acceptation of the term, there is little, if any, *striving*. Thus conation is a marked feature of the experience of a hungry man who is devouring a meal. If, however, there is some obstacle to his getting his dinner, there is a *strife* between his conation and the obstacle. We may say that the element of *strife* enters consciously into conation only when there is opposition to its course.

It is at such moments as this that the strength of a conation is tested. Sometimes, after a short strife, the conation dies; sometimes the strife waxes fiercer, the conation apparently becoming stronger. Thus a boy may set out to learn French and give up when he reaches the difficulties of irregular verbs; another, however, may be spurred to greater efforts by the opposition which he meets.

All our mental states, then, have three aspects—*cognition*, *feeling* and *conation*. Or, to put it in another way, we are at any moment (1) conscious of some object, (2) affected either agreeably or disagreeably by that object, and (3) proceeding on some course. The "proceeding" may be merely a further examination of the object, it may be a turning away from that object to some other connected with it, it may involve "proceeding" in the physical sense, *i.e.* an actual bodily movement towards or away from the object. In *all* cases, however, the "proceeding"

of which we speak is a continuance on some mental path, whether it involves much physical movement or not.

We have been speaking, of course, of mental states as we find them in introspecting. It may be that in the earliest weeks or months of life, and in the case of many of the lower animals, these three well-marked aspects cannot be traced. There may be in these cases much more rudimentary states. Some writers believe that the beginnings of mental life involve merely a vague, undifferentiated kind of feeling. It seems fairly certain that, long before a child comes to school, his mental states have developed beyond such a crude condition. Although they are probably not so clearly marked or so varied as our own, they seem as far as we can judge by appearances, and in some cases by memories of childhood's days, to possess quite definitely the three aspects to which we have referred.

All the mental states with which we as teachers are concerned can be considered from one point of view as cognitions, from another as conations. And in the background, exercising often an important influence on these processes, there is pleasure-pain. We shall begin by considering mental states as cognitions, attempting to analyse these states more profoundly, and to trace the way in which we rise from the simpler forms to the more complex. We must remember that conation and feeling are there all the time, though for purposes of simplicity we shall regard only the cognitive aspect, except where it is absolutely impossible to get on without reference to the other elements. In due course we shall have to return to conation and feeling, in order to show their influence in the mental life.

Questions on Chapter III.

1. Explain carefully what is meant by *cognition*. What various objects may succeed one another in the consciousness of a man making his last sprint at the end of a mile race?

2. What is *conation*? Give an example (*a*) of one conation being counteracted by another, (*b*) of one conation supporting another.

3. Indicate what is meant by *feeling-tone*, and give examples in which both varieties occur.

4. How can you explain the fact that the person who is always looking for pleasure is frequently disappointed?

5. Describe your states of consciousness (*a*) when reading a tale, (*b*) when walking to school, showing that cognition, feeling and conation are present together.

CHAPTER IV.

Sensation.

The object of my consciousness at the present moment is the paper on which I am writing. How has this become my object? It is obvious that if I had never looked at the paper it could never have been an object to me. Now what does this looking at the paper involve? It involves my eye being affected in a certain way. Rays of light are reflected from the paper in all directions.

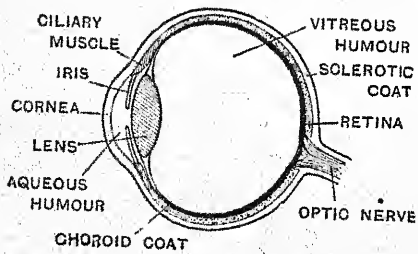


Fig. 13.—Section of the Eye.

Some of them pass through the transparent skin (or *cornea*) in the front of my eye, through a clear fluid (called the *aqueous humour*), through a small round transparent body (called the *lens*), by which they are converged through a clear jelly-like substance (called the *vitreous humour*), and are ultimately focused on the *retina*. This forms the coat of the back half of the interior of the eye. It is composed of nervous tissue which is formed by the spreading out of the optic nerve (see Fig. 13).

The various rays of light which impinge upon the retina produce chemical changes. These set up nervous impulses which pass along the optic nerve to certain of the basal ganglia of the brain. Some reflex actions, both of muscles within the eye and of muscles surrounding the eye, may thus be stimulated, and these movements would give rise (in a way which will be described shortly) to other afferent impulses, which in their turn might arouse new reflex actions. But if the impulses could confine themselves to such arcs of the first level, there would be little if any consciousness connected with them. There are, however, certain fibres proceeding from the basal ganglia in question to the occipital cortex. These fibres are also affected, and produce cortical excitation. The moment this occurs, there is consciousness. (There was, of course, consciousness *before*, if I was awake, but it was connected with other excitations. The consciousness which we are describing as suddenly arising is that due to looking at the paper.)

The consciousness which arises in connection with the excitation of the part of the cortex referred to is known as *sensation*.[1] ~~In this~~ case, the sensations which arise are called sight sensations. But in the adult, and even in infant life, the brain has become so organised that other parts of the cortex are affected, and other forms of consciousness arise concomitantly. We thus never get pure sensations in our mental life. Indeed, the other forms of consciousness which arise are so prominent that the sensations, as such, are usually neglected. I have sight sensations due to the presence of the paper, but these sensations are not my object. They help to constitute that object in my mind; that object, indeed, would not exist for me if I had not these sensations. But when I can say that I see the paper, my mental state is a very different thing from what a mere awareness of certain sensations would be, if it were possible to have such a rudimentary condition.

[1] As already pointed out (see footnote 1 on p. 30), some sensations may possibly occur before the excitations reach the cortex.

There are sometimes brief moments during which we do approximate to this simple state. When we are just waking up from sleep, for instance, the brain often takes a few moments to revert to its normal condition. The full circulation of blood necessary for normal mental activity has not yet recommenced. We open our eyes and certain cells of the occipital lobe are excited (through the paths already indicated) *an appreciable moment before* the spreading of the impulse along the usual well-worn paths to other portions of the cortex. For a moment we have a vague awareness or consciousness *without any distinct reference to any object*. This is such a rudimentary state of consciousness that we speak of ourselves as dazed or half-asleep. In a moment, however, we recognise the light streaming in from the window. We have an *object*. The nervous impulses have passed on through their usual paths to other parts of the cortex. We are *awake*. Through the medium of other sensations (which a moment before were so faint as not even to produce the vague awareness due to the more intense sight sensations) we have now a variety of objects—the bed, the room, ourselves, and so forth.

It is impossible, then, to rid ourselves of the more advanced state of consciousness which is aroused in waking life together with our sensations. Even if we could, there would be no profit for psychological investigation. For a state in which only sensations existed would involve a vague, dazed, indefinite condition of mind in which no such thing as cognition of an object would be present. As we should know nothing definite, we should remember nothing definite. And we should be as wise at the end as we were beforehand.

It is, perhaps, unnecessary to go to those rare moments between sleep and waking life to seek instances in which we approximate to a state of mere sensation. For alongside of our definite processes of cognition of objects, there are many sensations which vaguely affect us without giving rise to any clear consciousness. As I write, I have sensations due to the contact of my clothes with my body, to the pressure of my body on the chair, to

the general degree of illumination of the room, to heat or cold, to the state of my internal organs, and so forth. Now I cannot attend to many things at once. While I am attending to my writing, most of these other sensations pass unnoticed. But some of them, on account of their intensity, or because of a strong feeling-tone, may claim my attention. My writing is forgotten for the moment, and I think of some other object. I find the room too cold, and proceed to poke the fire. Or I recognise that I am hungry, and begin to wish for dinner-time.

The moment any group of sensations gets sufficient hold over me to claim my attention, a new object arises to obscure, if not to obliterate, all others. I have only a certain amount of nervous energy, and a corresponding amount of mental energy. Although there may be excitations in many parts of the cortex, there is not enough nervous energy to cause all these excitations to spread along those well-worn paths which each could follow if it were well backed up.

From such observations we conclude that the principle "To him that hath shall be given" appears to govern the psycho-physical economy. When any region of the nervous system is thrown into a state of excitation, it tends to drain the energy from other parts. There is, therefore, a continual competition among the various portions of the cortex excited at any given moment for the available nervous energy; or, to speak in mental terms, there is a strife among many sensations for supremacy. And victory involves that the impulses obtaining it are able to spread to other and higher centres, giving rise to definite cognition of a particular object, and weakening the excitations in other places, so that the sensations corresponding to those excitations are scarcely experienced at all.

There is seldom, however, a *complete* victory, and the supremacy does not last long. The obscured sensations remain in the background of the process of cognition in question, and some of them may gather strength, as this runs down, to reassert themselves, and to claim the right to that preponderance of mental activity which will raise them from obscurity to the clearness of cognition.

It might be thought that if I choose to direct my attention on the sensations which arise as I look at the paper, and to put aside resolutely all interpretation of them as paper, I could thus reduce my object to mere sensations. When I do this, I am indeed changing my object, but it is still an *object*, not a mere group of sensations. I *know*, whether I admit it or not, that I am disregarding the paper as such, and paying attention to a part of the object —its appearance. And in so far as I succeed in concentrating attention upon this, I begin to notice other details, as, for instance, the grain of the paper, the lines upon it, little specks here and there, and so on. All these are objects, and their existence for me is due to mental processes over and above mere sensations. If, finally, I *do* succeed in staring at the paper, forgetting it as an object and ignoring all the other objects connected with it, I am on the brink of success, but alas! I can *know* nothing of the state. For knowing, though *dependent* on sensation, is much *more* than sensation. If, as I say, I finally succeed, I go off into a dazed, stupid condition, of which, as I *know* nothing while it lasts, I can remember nothing afterwards. As a matter of fact, the hypnotic trance is often induced in some individuals by such means.

The reader by this time is probably somewhat confused with respect to the meaning of the word *object*. At one time it means something outside me, as, for instance, a piece of paper. At another time it refers to some state or process taking place in my mind. We must be content to accept both significations. There are certainly objects outside of us But it is equally certain that they would never become objects to us, unless certain processes took place in our minds. And if these mental processes could take place in exactly the same fashion, without there being any external object, and without anything happening to contradict our conviction, we should believe in an object outside of us just as firmly as we do when there is an external object.

This kind of thing has happened in some cases. It is called an *hallucination*. Individuals have been quite

certain that they had seen an object in a certain place, although many others have affirmed that nothing of the kind was there. But even if a thousand people agree that they see an object in a certain place, how are we to be certain that they are not all suffering from hallucination? There is no answer to this objection. Some philosophers have indeed maintained that we have no guarantee of the existence of any objects outside of us. We have only our mental states, they say, and we have no right to make assertions of things beyond them.

Such thinkers are sometimes known as *subjective idealists.* The majority of us, however, are content to believe that there are objects outside of us, even although we can only know them by means of our mental states.

We see, then, that cognition can scarcely be said to begin *with* sensation. It begins *from* sensation. We could never have cognition of external objects if we had never had sensations. But if we had only sensations, we should have no cognition. Long before a child comes to school, connections have in many cases been formed in its brain of such a nature that the excitation of sensory centres spreads at once to other centres. The sensations it receives, therefore, do not give rise merely to a vague awareness, but to a definite cognition of things, or, as is usually called, *perception.*

Sensation, therefore, *by itself*, is not cognition, but only the material of cognition. Just as the body assimilates food and transforms it into skin, bone, and muscle, so the mind receives sensations and makes objects out of them. This is a crude analogy. But it can be carried a step further. Just as the solid food cannot be swallowed whole, but must undergo some change in the mouth before it can even be received into the system, so the sensations are transformed (into objects) at their very entrance into the mind. And just as further changes take place in the case of food when it gets to the stomach, so, we shall find, other elaborations take place in the case of the objects. Just as a baby can only assimilate food of a few simple kinds, but later, when its body develops, is able to eat and digest many different varieties, so the

infant mind is only susceptible to a few sensations, but later, when its mind and brain develop, is able to deal with an immense variety of impressions.

Our analogy would appear to break down when it is pointed out that the body can assimilate very different foods; yet manufacture the *same materials* out of them. It does break down. But not completely, even here. For we shall find that many of the highest generalisations to which the mind attains can be reached from the basis of quite different sets of sensations. We have only to cite the case of Helen Keller,[1] a blind, deaf, mute girl who has come to think the same things as educated people, and to think more about them than the vast majority of fairly educated people in full possession of all their senses.

We are usually said to possess *five senses, i.e.* five different kinds of bodily apparatus whereby five varieties of stimuli from the outer world are able to set up nervous excitations which, if transmitted to certain parts of the brain, give rise to sensations of five distinct classes. We shall find that there are more than five. The senses usually enumerated are those of *sight, hearing, touch, taste,* and *smell.* We shall give a short description of each of these five, and also of those senses not usually distinguished.

The mechanism of the eye has already been briefly described. It remains to add that in the retina there are two kinds of visual sense-organs, the *rods* and the *cones,* so named after their shape. These tiny bodies are really the ends of sensory neurones. Light falling upon them produces chemical changes, and the resulting substances act as stimuli upon the sensory neurones. The rods and cones are packed closely side by side. But in the centre of the retina, cones only are to be found. This part is called the *fovea centralis.* It is the area on which the image of a thing falls when that thing is looked at directly. It is under these circumstances that we have the clearest vision.

In the zone surrounding the fovea, rods and cones are

[1] See *The World I Live in,* by Helen Keller. (She is now no longer mute.)

intermingled. In the outer zone there are very few cones. The cones seem to be necessary for us to see colours. Coloured objects which are far to the side of us are seen by means only of the rods, and appear as bluish grey. The reason why we are not aware of this is that we are continually shifting our eyes so as to bring things into more direct vision.

The rods seem to be the primitive forms of the visual sense-organs from which the cones have in the course of ages been developed. These rods are only capable of acting in a dim light. This they get when they are found near the outer part of the retina. But those nearer the centre are exhausted in a bright light, and only recover their normal state in a dim light, which is not strong enough to stimulate the cones. Hence, when we go from a light room into a dim one, we are almost blind for a moment. The light is not strong enough for the cones. But the rods soon recover, and we see everything as bluish grey.

Much has been written about the fact that the image focused on the retina is inverted, whereas we see things the right way up. But we must remember that it is not the eye which sees. Nobody can see the image on his own retina when he is looking at an object. It is in the cortex of the occipital lobe of the brain that the excitations are produced which give rise to visual sensations. Under normal circumstances, those excitations could not be produced without an image being focused on the retina. But if they *could* be, we should have the sensations in question. When I touch ink my finger becomes black. But, unless I look at my finger, I get no idea of the blackness through the sense of touch. What I get to know through a given sense may be very different from the kind of impression made upon the sense-organ. In the case of sight, it happens that there is an inverted image on the sense-organ (the retina) very much like the object which I come to know. But I do not see that inverted image.

It is to be remarked, further, that the sensations *alone* do not give rise to the seeing of an object. The excitations

must spread to other centres, so that a more complex mental state is produced, before we see an object. This has been verified in the case of men blind from birth who have suddenly received the power of obtaining sight sensations. Such men do not see objects at first. They are merely dazed. When, later, their visual sensations become overlaid with the products of other portions of their experience, they are at length able to see objects as we do.

In the case of hearing, the physical stimulus consists of vibrations of the air. These are collected by the external

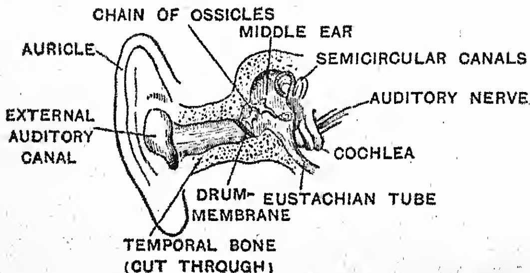


Fig. 14.—Diagrammatic View of the Ear.

ear or *auricle* (which merely acts like a small ear trumpet), pass down a narrow tube, and strike upon a drum. A chain of tiny bones or *ossicles*, attached to the inner surface of the drum, is set in vibration. An inner membrane, attached to the further end of the chain of ossicles, is thrown into motion. On its other side is the *internal ear* or *labyrinth*, so called because of its complicated shape. This consists of a central cavity, called the *vestibule*, with various canals or tubes springing from it and returning to it. It is filled with watery fluids which are set in motion when the vibration of the drum is communicated by the ossicles to the inner membrane.

The most important part of the labyrinth, from the point of view of hearing, is the *cochlea*, which consists of a

spiral canal made up of two-and-a-half turns, and appearing on the outside very much like a snail-shell. Its internal structure is somewhat complicated, and cannot be described here. It is sufficient to note that there are a large number of *hair-cells* (see Fig. 9) which are affected by the vibrations of the fluids. When these cells are set in vibration, they in their turn affect the fine branches of the auditory nerve which are distributed among them. The nervous impulse spreads to a part of the cortex in the temporal lobe of the brain, and sound sensations arise.

Another part of the labyrinth consists of three *semicircular canals* running out of, and back into, the vestibule, and also filled with fluid. They lie in such positions that each one occupies a different plane. They are not organs of hearing, but of *equilibration.* Any change in the position of the head, or of the body as a whole, causes a change of pressure within these canals, and gives rise to sensory stimulations. These stimulations, however, do not, under normal circumstances, reach the higher regions and give rise to sensations. They are distributed by lower centres of the nervous system to the muscles which keep the body erect by reflex action. It is only when they are extremely intense, as when we turn rapidly round and round, that they give rise to sensations. We then experience what is called dizziness. When the reflex actions to which we have referred are of an unusual kind, as in descending a lift, they give rise to definite *muscular sensations* (which sensations will be more clearly indicated later in this chapter), especially in the abdominal region.

Here, then, we have an extra sense—the sense of balance or equilibration—which has been overlooked by many writers. There is, however, plenty of excuse for this omission, seeing that the sensations we derive from this sense are few and indefinite. Although this sense deserves mention, it should scarcely be placed in company with sight and hearing, which give us so many and such varied sensations. It should rather be relegated to the company of the "lower" senses of which we shall presently treat.

For sensations of *touch* to arise, there must be con-

tact of some object with the surface of the skin. The skin contains minute end-organs of sensory nerves. These do not come out to the surface, but are in such close proximity to it that even a slight pressure upon it affects them. If the resulting impulses reach the cortex of the brain, we have sensations of touch. There are more end organs of touch in some parts of the skin than in others. Thus there are very many in any small area taken at the tips of the fingers, very few in an area of the same size taken in the middle of the back. If a pair of blunt compass points be pressed upon the skin of the finger tips, two separate contacts will be recognised as long as the points are not less than about $\frac{1}{12}$ inch apart. On the tip of the tongue only half this distance is necessary to produce the feeling of two separate contacts. But on the skin of the back the two points are felt as one at any distance less than about 2 inches. There are slight variations in these distances in different people, and even in the same person at different times (*e.g.* according to degree of fatigue). Practice also has some effect in reducing the distance.

But we do not merely feel pressure. We feel *heat*, *cold* and *pain*. Thus when I put my finger in a glass of cool water, I have sensations of contact and of cold. I do not always take the trouble to discriminate one from the other. They tend to *fuse*. But I can easily do so. It has, moreover, been found by experiment that different sense-organs are involved. A small area of the skin can be marked off, for instance, in the palm of the hand (where there are no hairs) and prodded all over gently with a hair. If this is done carefully and systematically, it will be found that it is only at certain points that sensations of pressure are produced. These points can be marked with an aniline pencil.

Now let the experimenter go over the same surface with a cold metal point. It will be possible to mark a number of different spots, the touching of which gives rise to distinct cold sensations, whereas the touching of the other portions does not produce this effect.

Next, a warmed metal point may be used. This will

lead to the discovery of a third series of spots—warm spots.

Lastly, a short horse-hair mounted in a match-stick may be used to prod smartly on the skin. A new variety of sensation will be experienced, a distinct smarting being felt at certain points. These will be found to constitute a fourth series. The smarting referred to is often called a *pain*-sensation. This is perhaps an unfortunate term. It is used because the pain is so prominent as to obscure any other quality. But the other sensations to which we have referred have their feeling-tone. Heat and cold sensations, for instance, may be either painful or pleasant. They are generally pleasant when the intensity of the heat or cold is only moderate, painful when the intensity is great.

We see, then, that what is often called the sense of touch includes several senses which have their sense-organs intermingled in the same parts of the body, viz. the senses of touch proper or pressure, of heat, of cold, and of "pain" or smarting.

There is still another sense which is connected with touch and is often subsumed under it. When we move any part of the body, we experience certain sensations known as *muscular* or *kinæsthetic sensations*. Not only are all the muscles supplied with motor nerve-fibres, which by conducting impulses to them are able to cause them to contract, but there are other sensory fibres with their endings or sense-organs in the muscles, in the tendons, and in the tissue lining the smooth surfaces of the joints. When movements take place, these sense-organs are stimulated, impulses are initiated, and if these excitations reach a certain area of the cortex (in this case surrounding the fissure of Rolando) we have sensations of a particular kind. Under normal circumstances, these sensations are not very intense. They do not, therefore, like visual sensations, for instance, succeed in attracting attention to such an extent that they form the principal basis for the mental construction of an object. But they nevertheless play a most important part in conjunction with other sensations, especially in conjunction with touch sensations.

When the baby stretches out its arm and grasps an

object, it not only has sensations of pressure, of temperature, and possibly of smarting (not to mention the sight sensations which accompany these others), but, both before and during its grasping, there are these muscular sensations. It is the whole complex of sensations which forms the basis for its cognition of the object, and the motor sensations are extremely important, especially in appreciating volume and shape.

Our cognition of space is largely dependent on the kinæsthetic sense. How is it that I can know how far my bare arm has moved when I am in the dark? There are no other sensations to guide me but those of the kinæsthetic sense. These motor sensations also fuse with visual sensations, and help in the formation of the object as seen. When, for instance, I look at a thing which is near, my eyes converge upon it, and in the interior of each eye there are certain other reflex actions to modify the shape of the lens. Although the motor sensations aroused in connection with such movements are very faint, they no doubt take their part with the visual sensations in determining the kind of object which I frame for myself. They probably help in deciding upon the distance of the object from me.

We come now to consider what are sometimes called the lower senses. They are so called because they contribute much less to our knowledge of external objects than those already described. And first, of *taste*. Here the tongue and the surrounding portions of the mouth and throat are the parts of the body in which the sense-organs[1] are found. It would appear to the uninitiated that we have a great variety of taste sensations. As a matter of fact we have only four kinds—sweet, bitter, sour and salt. There are special sense-organs for each variety. They consist of little groups of peculiarly modified cells of the skin (or *epithelium*) which are called *taste-buds*, and to which may be traced the delicate fibres from the glos-

[1] Sometimes the word *sense-organ* is used to denote the whole bodily structure in which the sensory nerve-endings are found, sometimes it is used, as above, to denote each of the many nerve-endings which are to be found in the larger structure.

sopharyngeal (9th) and gustatory (part of the 5th) nerves (see Fig. 8).

It should be noted that a substance cannot be tasted unless it is soluble. The saliva dissolves portions of our food and brings them in contact with the taste-buds. Many of these, indeed, are embedded in the linings of very narrow clefts, into which even small particles of solid food could not enter. The cells of the taste-bud are chemically affected by certain fluids, the nerve-fibres in connection with it are excited, and the impulse is transmitted to the higher centres, in connection with which a taste sensation arises.

The reader may still hold that we taste more than four varieties of things. This is quite true. But each of those varieties is based on a compound of sensations. And into this compound other sensations besides those of taste proper enter. The skin of the tongue has, in addition to the taste-buds, all the organs which give us sensations of touch, heat, cold, and smarting, while its muscles are supplied with sensory fibres which enable us to have muscular sensations in connection with it. More important still, sensations of smell arise when we are eating many things, and fuse so intimately with the other sensations that we fail to discriminate them. A person with his nose stopped up and blindfolded, so that he does not see what is given him, may sometimes be induced to eat a potato taking it for an apple. Even if such a person could not be deceived, it might be chiefly on account of the *texture* of the potato being different from that of the apple. The difference would then be largely in the tactual and muscular sensations experienced rather than in those of taste. There are, however, certain other sensations, of which we shall presently speak, and which are known as the *organic sensations*. Some of these are almost always fused with those of taste proper.

The organs of the sense of smell, or *olfactory cells*, as they are called, are located only in the upper part of the interior of the nose. Small particles probably detach themselves from certain substances, and are carried by the air currents of inspiration into the nasal cavity. If we

are breathing gently, so that the air inspired does not ascend to the upper region of the nose, these particles produce no appreciable effect. But the slightest increase of force in inspiration sends some of the particles into the upper part of the nose. There they produce a chemical effect upon the olfactory cells. These are true nerve-cells, and lie, intermingled with other supporting cells, on the surface. From them nerve-fibres pass to the brain. In the case of smell, then, the nervous tissue is directly in contact with the stimulating particle. This is probably the reason why an odour which is very striking at first soon grows less and less impressive, even though the stimulus continues at its original intensity. The different qualities of olfactory sensations have not as yet been clearly discriminated. There are quite a number of different sensations possible. It is scarcely necessary to repeat that they are often fused with taste sensations. Touch is also present in the nose, and some of our "smells," *e.g.* pungent ones, owe a good deal to the presence of tactual sensations. Organic sensations are also intermingled with sensations of smell proper

It remains to speak more fully of the sense to which reference has just been made—the *organic sense.* It is often ignored by unscientific writers, but it has nevertheless an important influence on our lives. Many scientists believe that all the senses which have already been described have in the course of long ages been differentiated from one simple sense, more allied to touch than to any of the others. Many parts of the body are supplied with sensory nerves the stimulation of which leads to sensation of a vague kind which is probably the primitive quality referred to. These sensations are so vague under normal circumstances that they arouse no definite consciousness. They remain in the background of consciousness, giving rise usually to no cognition of objects, though they contribute largely to our feeling of well-being or discomfort. When there is any internal disturbance, such as inflammation or injury to the organs, they become very painful. Closely allied to these sensations are certain other sensations due to the stimulation of sense-organs in the viscera

similar to those of touch. These sensations are also vague and feeble, except when the visceral functions are disturbed, when we get, for instance, such sensations as those involved in hunger and thirst, in nausea, colic, palpitation, flushing, and so forth. Organic sensations probably play a large part in the consciousness of *ourselves.* We sometimes hear the expression: "I don't feel myself to-day." The state of consciousness implied by such words is due to changes in the organic sensations.

The sensations of each of the senses which we have described are in most cases clearly distinguishable from those of the other senses. When we have sensations of sight, we do not confuse our experience with that of touching a table or hearing a sound. All the sensations of a given sense, in spite of their differences, have something in common: they possess the same *generic quality.* Each sensation, however, differs from all others—even of the same sense. In other words, the sensations of a given *generic quality* have each a *specific quality.* Thus blue differs from red in specific quality. But both have the same generic quality—they are both colours, and, as such, much more different from the sound of an organ than each is from the other.

But we can have different sensations of the same specific quality—according to *intensity.* Thus the same musical note played on the same instrument may be loud or soft, and of different degrees of loudness or softness. Very great varieties can occur in this way, without passing beyond one specific quality. Sensations also differ in *duration,* some lasting a longer time than others.

Any two sensations of touch or of sight, though alike in all other respects, may differ in their *extensity* or "spread." We may have more or less of a sensation without difference in any of the other qualities already mentioned. But there are *other* differences which arise in this connection. A sensation due to stimulation of one portion of the skin (or retina) must be *slightly* different from a sensation, *alike in specific quality, extensity, and intensity,* but due to stimulation of some other portion of the skin

(or retina). How otherwise should I be able to know which portion of my skin has been touched when I am in the dark? The slight differences which exist between sensations in this respect are called differences of *local sign*. These differences, together with the differences in extensity, contribute important factors in our knowledge of space.

The numerous and varied sensations which we receive help to make it possible for us to know so many things, and to think so many thoughts. But it must once more be repeated that sensations alone are not knowledge. They are, as it were, the raw material out of which knowledge is fabricated. We shall deal with that fabrication in the following chapters.

Questions on Chapter IV.

1. State clearly what you understand by the term *sensation*.

2. Briefly describe the physical processes which must take place before I can see an object.

3. The image of an object focused on the retina of the eye is inverted. How can you explain the fact that we see the object the right way up?

4. What are *kinæsthetic sensations*, and what is their importance for knowledge of the world around us?

5. Indicate clearly the various sensations which can be produced by stimulation of the outer skin.

6. What are *organic sensations*, and what part do they play in knowledge?

7. Explain what is meant by the terms *extensity* and *local sign* as applied to sensations.

8. We could know nothing if we had never had any sensations; yet sensations give us no knowledge. Explain this apparent paradox.

9. A baby is in slight pain and consequently fretful. It hears the sound of music or sees a bright light, and immediately beams with pleasure. How do you account for the change in its attitude?

CHAPTER V.

PERCEPTION.

Perception is the simplest form of knowledge. It is the cognition of external objects on the basis of certain sensations experienced. The objects so cognised, when considered from the mental point of view, *i.e.* as psychical constructions,[1] are usually referred to as *percepts*. The percept is often defined as sensation + meaning. We have certain sensations, and these mean to us that there is an object. The only danger of such definitions is that they tend to cause us to think that the sensations arise first, and then come to mean something. In actual experience, however, we come to mean some object in the vast majority of cases without any distinct consciousness of the sensations involved. There is *one* process, of which sensations are, it is true, an essential factor; the conscious result, however, is not a knowledge of the sensations, but of some object. We know objects long before we come to know of sensations.

We have already pointed out that the cortical excitations corresponding on the physical side to the sensations are complicated by other excitations immediately aroused in other cortical parts. To what are these other excitations due? Some of them are probably revivals of nervous impulses which were originally excited in the same way as the excitations which occasion the sensations. But why should they be re-excited without that stimulation of the sense-organs which originally gave rise to them? The answer is that once at least the two excitations were produced together, by stimulation of two sense-organs.

[1] See remarks on the two meanings of *object* (pp. 48, 49).

When two centres are excited together, they become connected, paths for the passage of nervous energy being worn between them. If one is later re-excited, the impulse spreads along the paths previously worn, and excites the other centre in some degree. We then get one sensation with a faint "halo"—a trace of the other sensations which once accompanied the first. We have supposed only *two* sensations to start with. In practice the matter is more complicated. Suppose that I look at a piece of ice and touch it. I get sight sensations and a combination of tactual, muscular, and cold sensations. On another occasion I merely see the ice. Traces of the other sensations due to touching the ice are aroused, and are fused with the sight sensations. I may even shiver at the sight. The ice "looks cold" to me. This process is called by Professor Stout *complication*. We have taken a very simple case. But as experience progresses, a very large number of sensation traces become involved.

Some psychologists would appear to be satisfied with this as an explanation of perception. In perception, according to them, we have one or more sensations complicated with the revived traces of many previous sensations. Now these revived traces must be "sensational" in character, and we might almost call them faint sensations. Perception would thus be regarded as a sort of combination of sensations. But after what we have said with respect to sensations, it seems no more possible for a combination of sensations to constitute cognition of an *object* than for one sensation to do so. There is no doubt that the revived traces, which are complicated with the actual sensation or sensations experienced, help to guide the process. What kind of object we perceive is partly determined by their agency. But the existence of those revived traces together with the actual sensations does not account for perception. "A percept is to be thought of, not as a mere combination of sensations, but as *the result of a highly organised perceptual apparatus*. . . ."[1]

[1] Kirkpatrick, *Genetic Psychology*, pp. 157, 158.

Since there is more consciousness involved in this cognition of an object than can be accounted for by a combination of sensations and revived traces of other sensations, there must be more centres involved than those of mere sensation. We must suppose, though we have no certainty on the point, that there are special perceptual centres, and that when these are excited, there is that peculiar transformation which involves cognising *objects* instead of being vaguely aware of mere sensations. How such centres have developed we cannot say; they are probably largely innate. But it seems impossible to get on without supposing them. We must, however, remember that this cognition of objects is guided by the sensations and sensation-traces. It is, indeed, stirred up by them. The perceptual centres must be conceived as capable of excitation, under normal circumstances, only along nervous paths leading from the sensory areas of the cortex.

Probably these perceptual centres take some months to develop fully in the case of human babies. But they seem to be already developed at birth in the case of some of the lower animals. The chick fresh from the egg begins almost immediately to peck at seeds, and shows remarkable accuracy from the first.

Although perception does not consist merely in the reception of certain sensations and the revival of traces of others, the importance of sensations as factors in perception is not diminished. They at any rate arouse and guide our perceptions. If the perceptual centres can only be excited through paths leading from the sensory centres, and if the nature of what is perceived is determined by the excitations taking place in the sensory cortex, it is obvious that we cannot come to know minutely and accurately all the objects which constitute our environment without experiencing a corresponding wealth of sensations.

Nature seems to have provided for this necessity of a varied sensational experience by ordaining that young children shall be constitutionally active. They are for ever on the track of new sensations. Nobody can watch a healthy infant without being struck by its tendency to handle, look at, roll, rattle, bite, and otherwise experiment

upon, all objects which come within its reach. It even plays with its own toes. And in doing this it acquires more and more definite percepts, which enable it to distinguish its own body from external objects. In handling parts of its own body, it not only receives the same kinds of sensations which it would receive were those objects parts of another's body, but it experiences sensations of touch and movement *in connection with the parts handled.* These important additional sensations serve to mediate or guide the perception of its own body as something quite different from the other objects with which it plays.

Our perceptual experience is tolerably complete when we reach the adult stage. Yet even then we can improve it by continued activity in any given field. Thus the tea-taster has learned to distinguish many more varieties of tea than the ordinary individual, the artist differentiates between many more shades of colour than the city clerk, the organist recognises more variations of tune and pitch than the moderately musical amateur. Apart, however, from such special aptitudes, created by long practice and experience, there is a vast field of common objects which all adults seem to perceive with something like an average amount of skill. As young children can handle these objects and even talk about them (though in much of their talk they may be echoing our sounds without giving our meanings to them), we are tempted to imagine that they see, feel and hear just as we do. We forget that our ability is the result of a long process of development and experience. And we are inclined to minimise the importance for the child of touching and handling objects as well as seeing them. We fall back on *words*, which arouse, indeed, certain clear ideas in our own minds, but which do not necessarily arouse the same rich meaning in the minds of the children. We fail to understand that clear and adequate ideas of objects cannot arise unless there has been a rich and varied supply of sensations. We are making the same kind of mistake as the ignorant man in the street who attempts to direct a stranger to a desired destination by talking glibly of many signs and landmarks with which that person is totally unfamiliar.

It has already been pointed out that the cognition of solid objects involves tactual and muscular sensations. These must be frequent and varied. It is, indeed, through motor experiences that the child is able to distinguish both himself on the one hand and external objects on the other. He is continually moving, and thus obtaining muscular sensations, which he repeats over and over again. But other sensations—of sight and of touch—break in upon his movements. He gradually finds that only with certain movements *which he can control* can he get certain sights and touches, and avoid others. In other words, by *motor adaptation* to his environment he gradually comes to distinguish things which are not so closely related to himself as are his movements. In movement, then, he finds both himself as an active being, and external objects as things to which his activities must be adapted. After much experience of this kind, it is possible to form adequate notions of objects by sight alone. But we must not hurry the children on to dependence on one sense merely because *we* can gather so much by that means. This caution is being more fully recognised in modern times. There is an increasing demand for more handwork in the schools, for much more manipulation of objects by the children.

Woodwork has long been a recognised part of a boy's education. Now the chief object of woodwork in schools is not to prepare the boys for carpentry as a trade, nor even as a means of accustoming them to use their hands in order that they may be ready for any kind of manual work in later life, though such benefits do follow and are not to be despised. Woodwork, as well as other forms of handwork, such as paper-folding, cardboard-modelling, clay-modelling, and raffia work, is a *method* in education. It involves the great psychological principle of *learning by doing*. Accordingly, some form of handwork should be introduced into every subject which is susceptible to such treatment. Thus in arithmetic a solid acquaintance with number can be acquired in connection with various forms of handwork. Many forms of handwork involve some estimation of size and proportion, some

counting of parts or a measuring of distances. In making a paper box to a required pattern there are processes of measuring and counting which develop a child's knowledge of numbers and skill in dealing with them in a way which is far more valuable than set exercises, even when those exercises are upon concrete things. For the child has a purpose, he wishes to make something, and he feels the utility of the processes through which he must go.

To take a subject not often brought into connection with handwork, history, especially on its dramatic side, will give frequent opportunities for the introduction of the child's own activity. "The idea of acting historical scenes is gaining ground in schools and gives abundant opportunity for the manufacture of all kinds of adjuncts —crowns, sceptres, swords, bows, arrows, targets, etc. Many other objects illustrating History may be made by the scholars. Boats, carts, and various implements may be made illustrative of different periods, and dolls dressed in costume to represent a Crusader, a Canterbury Pilgrim, etc. One plan of using handwork in education which we have studied and seen in operation, is based entirely on the historical idea. In this scheme the children, from their earliest years, attempt, within their means, to reproduce the early life of mankind. They make their own wigwams, dig out their own canoes, sharpen their stone implements, and weave their own rough cloth and baskets."[1] Such views of handwork make it essential that it should not be considered as a separate subject, with a special instructor, more or less out of touch with the other subjects, but as a vivifying influence permeating the whole curriculum, making the children active doers instead of passive recipients of information.

Perhaps we adults can best realise the need of *doing* as an essential in *learning* by considering the way in which we ourselves come to understand a new complex. Take as an example a new game of cards. We may have it described to us, we may even watch others playing it;

[1] *Manual Instruction in Public Elementary Schools*, Board of Education, pp. 7, 8.

but until we ourselves take a hand in a game, we do not thoroughly understand and appreciate it. As a rule, too, we have no desire to understand it until we arrive at the point of actually taking part in it.

It is found that the children take more pleasure in their school work under these more active conditions. And it is coming to be more and more recognised that, in most cases, pleasure is a sign of healthy and profitable activity. Some educationists, indeed, would condemn any system of education under which the children do not enjoy themselves. It is to be noted that the pleasure derived by the children taught according to these modern methods is not merely due to the fact that they are naturally impelled to bodily activity and that indulgence of this tendency is pleasant, but it is also to some extent attributable to the fact that they gain more knowledge of things in this way and are thus more able to understand the instruction imparted to them. When the teacher uses words—and some lessons will always have to be largely oral—these words evoke fuller and richer ideas in the minds of the children because of the more varied experience which can be revived. Success in understanding is itself pleasurable. Few children who are able to follow completely the instruction of the teacher fail to take pleasure in so doing, unless, indeed, the teacher is talking about what they already know fairly well. We are all bored by hearing the old things dished up again. But we can hardly be said to "follow completely" under such circumstances. We tend to divert our attention elsewhere.

There is, as we have already noted, an area of the cortex surrounding the fissure of Rolando composed of those centres which are excited when movements are made, and which thus give rise to kinæsthetic sensations. The area in question is very large, and we are therefore justified in assuming that movements and their resulting sensations form a large and important factor in our mental life. *Movement enters into all perception.* For in every case the excitations produced by the stimulus give rise by reflex action to adjustments of the sense-organ. For instance,

the eye is turned to the object, and the lens is accommodated. In more complex acts of perception there is often a series of sensation-reflexes accommodating the sense-organ to the movements of the object. Thus, when I follow a moving object, I keep on turning my eye, and perhaps move my head also. When I grasp an object with my hand, there is a continued and elaborate series of adjustments according to the form of the object.

Now whether the perceptual centres are considered as in part constituted out of these motor areas or not, they are at any rate intimately connected with them. In the case of the chick, we saw reason to believe that the perceptual centres were well developed at birth. It may very well be that even in the young child, though they are not so fully developed, they are already partially formed, so that the exercise of the arms and hands in producing motor sensations causes impulses to reach these perceptual centres also, exciting them to fuller activity. If this is so, much movement is necessary in order to develop adequate perception. It is likely that the motor areas referred to are congenitally connected also with still higher centres (which we shall more fully consider later)—those, *e.g.*, of speech—and that these higher centres are also aided in their development by a large amount of perceptual movement. It is found, for instance, that mentally defective children, one of whose prominent characteristics is poverty of speech, are greatly improved with respect to their power over language by a course of educational handwork.

There is a further reason why movement gives us richer percepts. Every movement we make, in addition to the sensations to which it gives rise by means of the afferent nerves of the kinæsthetic sense, also changes the other sensations received from the object. It gives us new percepts of the same object. Thus, when a child moves his hands over an object, he not only gets muscular sensations, but new sensations of contact. When he turns the object about in his hands while looking at it, he gets new views of it. So also when he walks round a large object. When he shakes his rattle, he gets sound sensations as

well as the changing visual sensations which he experiences if he happens to be looking at it.

We have already noted this in speaking of *motor adaptation*. But we were then not so much concerned with the *richness* of perception as with the fundamental distinction between *self* and *not-self*, between the *ego* and the *non ego*, which arises in connection with this adaptation. *Now* we are concerned to point out that not only is movement necessary to give us our first notions of external objects, but it is also essential to the filling out of those notions. "When we thus study the baby, the mental characteristic which stands out most clearly is that, far from recognising separate sensations and then building them up into more and more complex combinations, his whole consciousness is a vague sentience. In it are at first no distinctions at all, either of things or even of himself from his surroundings. The whole course of life is a progressive analysis of that primary experience. This process goes on throughout by activity."[1] And the first stage of this activity is perception. From this point of view, then, "perceiving is an *act*, a thing that we *do*, always and everywhere, never a mere passive sensing of a group of passing sensations or impressions. It probably always involves actual innervation of muscles, and indeed co-ordinated and organised, we may say unitized, innervation of muscles. Certainly on the psychic side there is an active and more or less unitized movement of mind, a sense of inner activity."[2] Or, as Dr. Nunn puts it, "the starting point of the educational process must be the 'sensori-motor reaction.' By this maxim modern pedagogy replaces the maxim—the inspiration of so much of the teaching reform of the last century—that the educational process starts from the child's sensations."[3]

To sum up, we may say that every case of perception involves a response of the psycho-physical organism to the impression constituted by certain sensations. This re-

[1] Welton, *Psychology of Education*, p. 145.

[2] Huey, *The Psychology and Pedagogy of Reading*, p. 1[illegible]4.

[3] T. P. Nunn on "The General Principles of Handicraft Instruction" in *The Journal of Experimental Psychology*, Nov. 1911, p. 113.

sponse must begin before any cognition of the object can occur; it is, indeed, the act of cognition itself. Hence the cognition of an external object is dependent partly on the impression from without, partly on subjective factors within. These subjective factors usually include revivals of past experience, not necessarily definite revivals recognised as such, but more or less dim traces of sensational and other elements which have been associated with the same kind of impression on previous occasions. *In every act of perception there is thus a co-operation of subjective and objective factors.* And sometimes the former play a much more important part in producing the final result—the cognition of an object—than the latter.

Thus, in experimenting with words, showing them, slightly altered, for brief moments, Pillsbury found in a few cases "that the suggestion from the association was stronger than the visual impression in determining the word read."[1] In one case, for instance, the subjective factors were tampered with beforehand by calling out a word different from the "word" to be shown, but of similar meaning, the subject of the experiment understanding fully what was being done. Thus *verbati* was shown, *word for word* having been previously called out. The latter called up in the mind of the subject (as he declared afterwards) the word *exactly*, which he thus expected to see. He actually perceived the word *overexact*, and stated definitely that *he saw all the letters!* In another instance, after many adverbs ending in *-ly* had been shown, the combination *fellw* appeared on the screen, and was read *folly*, the subject again declaring that he saw all the letters of the word as read. "In many cases it was noticed that the letters which were most certain and of whose presence the subject is most confident were not on the slide, but were added subjectively. . . . These facts show that for the individual the centrally excited sensations are just as truly real parts of the word perceived as the peripherally excited."[1]

[1] Pillsbury, "A Study in Apperception," *American Journal of Psychology*, Vol. 8, pp. 356 ff.

When the individual's percept does not correspond with the external object, we call it an *illusion*. In actual experience we get comparatively few of these illusions, (1) because the subjective factors are continually being controlled by the multifarious impressions which stream in from without, and (2) because in most cases the objects cognised have been perceived many times before, so that the associated factors called up, being the results of numerous "correct" or normal percepts in the past, are in harmony with the objective factors. But since in young children the second of these guarantees of correct perception is often lacking, it is important that the first should have full scope. In other words, we should make sure that the children avoid illusory percepts of objects by allowing them to obtain "multifarious impressions." This can be done only by permitting them to handle, and otherwise actively deal with, the objects to be perceived.

So close is the connection between perception and movement that we usually find the advance in cognition implied in perceptual progress paralleled by a corresponding advance in dexterity. In other words, knowledge and skill develop together—at any rate as far as perception is concerned. As a boy improves by practice in cricket, it is difficult to separate his advance in accuracy of perception from his skill in making the necessary movements. A watchmaker's skill in manipulating the fine mechanism of a watch develops concurrently with his perceptual acquaintance with it. As a boy becomes adept in modelling an object, he gains a more complete knowledge of its form. We find, indeed, that modelling has a good effect on accuracy in drawing.

It should be observed that we have only asserted that *perceptual* knowledge advances concurrently with advance in skill. If we said that *all* knowledge was accompanied by increase in manual dexterity, the reader could easily cite contradictory cases. There are, for instance, many acute critics of sports who are not very skilful themselves. As a rule they *have* played the game of which they know so much, and have acquired some skill in it.

This, indeed, seems to be an essential condition for a sound knowledge of the game. One can only know thoroughly by doing.

But there are many expert performers who are not equally good judges of the game, and who would make very poor critics; and *vice versa.* To take an example of the latter extreme, Ruskin shows in his *Modern Painters,* and in other works, a minute knowledge of the technique of painting. Yet he was by no means a highly talented artist. He could and did paint. And without this skill he would never have possessed a foundation for his great knowledge of art. But his skill and perception having run together up to a certain point, we find his knowledge increasing while his skill lags behind. Our general statement is not thereby invalidated. Skill and accuracy of *perception* do run parallel. But there are further developments of knowledge which go on independently of skill. *Ideas* arise in the course of our developing skill. And these may grow and multiply far beyond the limits of that perceptual skill. What exactly we understand by *ideas* will be discussed in succeeding chapters (on Ideation). We must take them on trust for the present. They begin to arise very early in life; and they enrich, and render more significant, the percepts which we obtain. This play of ideas upon percepts, involving as it does not only a richer significance in the percepts, but additions to, and developments of, the ideas, is known as *observation.*

Observation has been defined by some writers as *regulated and concentrated perception.* A kitten perceives a ball of twine, and continues for a moment to regard it casually. This is a case of ordinary perception. Now suppose the ball of twine begins to move. At once the kitten's gaze is more fixed; its attention is more fully concentrated on the ball, and the direction of that attention is regulated by the movements of the ball. The kitten would be said by some people to be *observing* the ball. But the "orderly conning over the visible and inferior creature" which takes place during a nature-study or observation lesson in the elementary school is much more than this. The kitten probably does little

more than sharpen his perceptive powers. In future, he will be more excited by the ball than he was formerly. Yet he will not *know* anything definite about it. But the observation practised by human beings includes much more than mere perception, however refined and concentrated.

To understand this distinction, it must be borne in mind that perception goes no farther than the bare cognition of objects around us, the affective and emotional states excited by them, and the adaptation of our movements in harmony with them. As soon as a child has developed to any appreciable extent, other cortical centres, of which we shall speak later, come to play a part in his perceptual activities. Their activity is now as inevitably aroused in connection with that of the perceptual centres as the activity of the latter is evoked by that of the sensory centres. Even a young child does more than perceive. He has *ideas*, which have grown up in connection with past experience. And his perceptual activities are interwoven with, and modified by, these ideational products. I look around on the objects of my room. As soon as I concentrate my attention on any one of them, it becomes more than a mere percept to me. Even if I begin to tell them off in a hurry, there is more than the bare cognition of each object. "That is the piano, that the clock, that the fender," I say. It matters not whether I speak aloud or merely think these things. There is always something more than mere perception. There is *thought*.

I cannot speak, or even mentally utter, such words as *piano, clock, fender,* without going beyond the world of perception. These words correspond to *ideas*. And all my clear perceptions of things are overlaid with such ideas. A savage straight from the wilds of Africa could *perceive* as much as I in looking at the piano. But he has no idea of its use; nor can he apply a distinctive name to it. Even he, however, has his stock of ideas, his class-names, and though this object may puzzle him, he does not merely regard it as an external object; he probably thinks of it as a funny thing, or as one of those curious things

made by the white men. If he begins to examine it more closely, he is able to note the various parts of which it is composed, and here his ideational activity is much more definite. He recognises the white keys as made of *ivory*, the exterior as of a wood not unlike some kinds which he has dealt with, and so on.

A human being always brings into the field of perception a stock of ideas accompanied by names of classes of things, and with these he mentally labels the objects with which perception presents him. This occurs even in our casual looking round on objects, in so far as we concentrate our attention upon any of them. The nearest approach we adults get to mere perception is in the case of objects which we have to recognise sufficiently for adaptation of our movements to them, but to which we do not give the whole of our attention. Thus, as we pass rapidly along the streets, thinking, it may be, of the duties which await us, we turn and twist to avoid posts, and horses, and people, without considering what these things *are*. The moment anything happens to cause us to do *this*, our attention is switched from our thoughts of "higher" things to be turned upon the objects which surround us, and we begin to think upon these, *i.e.* we begin to place them in the classes which we have framed for ourselves in the course of our past experience. Thus I may be jostled by another person, and in a moment I recognise that *he is walking on the wrong side of the pavement.* "In College chapel," Mr. Winch tells us, "I was not aware that the stalls were surmounted by carved figures till I had knocked my head against one." [1]

We drop back, on the other hand, from the ideational to the purely perceptual level in some cases where a great bodily effort crowds out thought for the moment. Thus, when I am reaching for an object which is very difficult to attain, there is often a moment just before I succeed during which all my mental activity is occupied with the effort and adaptation necessary to seize the thing. During this moment, all thought of the thing as a definite,

[1] Winch, *Problems in Education*, Section on *Observation*.

recognised object which I wish to obtain is suspended; it is merely *an* object to which adaptations of movement are being made. There is no observation, there is mere perception.

The kind of observation which we have been describing is practised a good deal in the younger classes of schools, especially in infants' schools. It is quite true that children arrive even at the infant school with this form of observation largely developed. Little children are for ever observing and stating to their elders what they see. "Look, mummy, see that nice gee-gee," is a type of what is continually going on. The justification for systematic continuance of these processes under the guidance of the teacher is that the nature of the child is thereby encouraged to still further development, his ideas of the objects of his environment being increased and rendered more definite. After all, the most we can expect to do as educators is to help on the natural processes by providing suitable circumstances. Hence we find the infants in our schools playing with Froebel's gifts, singing or saying meanwhile what they notice and what they do.

Such continuation and extension of the children's activities is not however *merely* a continuation and extension of what the children would do by themselves. Left to themselves, children tend to notice only those things, or aspects of things, which they have already noticed. They do, indeed, make some progress in the acquirement of new knowledge of their environment. But that knowledge would remain exceedingly imperfect and incomplete if they depended entirely on themselves.

"Let us remember . . . . that in the case of the child the life of feeling and of impulse overwhelms for a long time the activity of the intellect, that the critical subordination of his fancies to the actual impressions is still to a great extent wanting, allowing us to surmise that the perception of the child is more emotional and personifying in character than theoretical and observing, that what he apprehends is borrowed more from the life of feeling and impulse and from his own world of fancy than from exact analysis of the properties of the things, grounded on

earlier perceptions."[1] In short, he is guided in his observations by the feelings, impulses and fancies of the moment rather than by any desire for accuracy and truth. Mr. Rooper, a late Inspector of Schools, tells us of a child who called a vase of ferns a pot of green feathers. A closer and more continued observation would soon have caused him to change his views. This closer observation is secured by the teacher's questions, by the child being allowed to handle the object, and by any exercises in connection with it—such as drawing or modelling—which the child is induced to undertake. The teacher thus acts as a guide to the child in the process of observation.

"Just the same kind of thing holds good for the adult. When I wish to extend my observation over a sphere which until now has been relatively unknown to me, *e.g.* over art or farming, I obtain the help of a specialist in that sphere and get him to impart to me his general lines of observation. Then I try to go forward in original and new ways on my own account. But if I omit to obtain this guidance, I shall probably, even with long and fatiguing toil, fail to go as far as the specialist would take me in half an hour."[2] Now in the work of early observation, and with respect to any given object, the teacher is relatively a specialist when compared with the child. By his questions and his remarks he can guide the curiosity of the child into fruitful channels, so that pleasure and profit may be the result.

This, however, does not mean that the teacher is to *tell* the child what he observes. To *direct* the children's observation is a very different thing from telling them the results of one's own observation. In all the object or nature-study lessons the teacher should encourage and guide the children by means of questions to look carefully for themselves and say what they see. Some of the first "oral composition" lessons may well consist in examining a picture and describing it. In this way we are not only developing the children's attention, but their powers of

[1] Meumann, *Vorlesungen*, Band I., pp. 123, 124.
[2] Meumann, *op. cit.*, Band II., p. 193.

thought and speech. These powers are most intimately connected. Ideas and words develop in close interrelation. In requiring words from the children we are obliging them to frame clear ideas. "It is hardly possible to over-estimate the extent to which the child's mental growth, due in the first place to his own powers of observation, of retention, of discrimination, and of comparison, is stimulated by the hearing and use of words."[1]

From this point of view, Mr. Winch's criticism on the object lessons in German schools, to the effect that they tend to become *language* lessons,[2] loses some of its force. It would, of course, be fully justified if it condemned talking about things *without seeing and handling* them. This would be a return to the errors of the past, the *words without things*, condemned by the reformers of three centuries ago. In so far, too, as the attention to the *grammatical form* of the language becomes so excessive that there is little observation of the *things*, there is also room for Mr. Winch's criticism of the lessons in question as *object* lessons. This is in fact his chief point. But it must be borne in mind that in all observation lessons, the *expression* of his own observations by the child is a most important part. It is not only a guarantee that he has certain ideas, but it tends to fix and clarify those ideas. If the teacher looks and tells the child what *he* sees, there is little, if any, profit for the scholar.

Observation of the kind which we have described is a necessary part of a young child's education. In addition to furthering nature's own development, it calls the child's attention to many things which, if left to himself, he would not notice. This is what is called in many educational books "the training of the senses." Such a term, however, is a misnomer. The teacher does not profess to improve the sense organs and their methods of functioning. He should, of course, take account of weaknesses in these organs in his dealings with the children. For instance, a short-sighted boy will be brought near the blackboard; a boy

[1] Mumford, *The Dawn of Character*, p. 31.
[2] Winch, *Notes on German Schools.*

who is somewhat deaf will not be placed at the back of the class. Where any medical treatment is necessary, the parents should be notified. But no amount of observation in class will improve the eyes of a myopic pupil, or the hearing of a partially deaf lad, or indeed any other of the senses. What these observation lessons set out to provide is an improvement in the *use* made of those senses which exist.

John Locke, the first great English psychologist, taught that there is nothing in the mind which is not due to the senses. This means that all our ideas are *ultimately* due to perception, some of them directly shooting out of perception, and others being produced from these. Now observation is the process whereby the fundamental ideational shoots are developed from perception. It is, then, a process of gaining and refining *ideas* in connection with perception. It is the enriching of "mere" perception by ideas. In this process we use the ideas already obtained upon fresh material, refining those ideas and often obtaining new ones. Such observation leaves its ideational traces in the mind, and thus serves as a basis for higher intellectual development. It is, indeed, a necessary preliminary to a vigorous life of thought. We may say approximately that the higher processes of thought bear the same relation to observation as this does to mere perception, or as perception does to sensation.

But we can carry on exercises in the observation of common things too far and into too great detail. During a craze for observation not long ago, it was pointed out that many of us have never observed how many buttons we have on our waistcoats, how many steps we go up day by day to reach our rooms, which arm we put into our coats first when dressing ourselves, and such-like details. These are some of the things which remain with most of us on the purely perceptual level. And rightly so! For there is nothing to be gained by applying thought to them. The perceptions can take care of themselves. If an extra button did suddenly spring into being on our waistcoats, we should soon begin to notice it. If there were one step less on the flight of stairs, we should discover ourselves

pawing the air in search of the missing part. If somebody holds the "wrong" armhole to us first, we are at once aware of the awkwardness of the situation. It is, indeed, only when our habitual adaptations to our environment are disturbed by something new—either really new or the old presented in a new light—that the necessity for thought arises.

This brings us to a most important point. Observation beyond a certain stage, *if without definite purpose*, is useless. It may, indeed, be harmful. For it may arrest the advance of the mind to higher things. "How odd it is that anyone should not see that all observation must be for or against some view if it is to be of any service!" (Darwin.) Here a higher type of observation is spoken of. When the more elementary kind has reached a certain level, and in so doing has developed our powers of thought, it is time for these last to become the masters of the situation. We now observe in order to work out, or add to, some ideas: in other words, to seek some result of which we have already a more or less vague notion. The boy who is set to analyse a salt is at this stage. He watches narrowly the things that happen in order to decide in what class to place his substance. As he goes on, his ideas as to what he is arriving at become more and more definite, and specify and direct his observations still more completely.

It is not a question of observing all that can be noticed, but of noticing *certain things*. The more ideas he has, the more effective are his observations. This may be stated as a general truth. The highest kind of observation is not only dependent on, but governed by, knowledge. We must know what to look for. *Man sieht nur was man weiss.*[1] This applies of course also, as we have already seen, to the lower type of observation which has just been considered. The words which are used represent *ideas*, and these are forms of knowledge acquired by previous

[1] "We see only what we know." This does not, of course, mean that we know everything before looking, but that we can only gain by our looking on the basis of our previous knowledge. (If we have *no* previous knowledge, we can only "gape" at the thing presented.)

experience. Unless a child has some ideas of colour, form, hardness, etc., he cannot take part even in a simple object lesson on coal. But the truth is particularly evident in connection with the higher types of observation. For in these *ideas take the lead and govern the whole process.* We must not only know what to look for, *but what to ignore.*

Professor Adams in one of his lectures gave an interesting illustration. A young doctor met a case of small-pox, but, even after careful scrutiny, was uncertain about it, never having met a case in these days of comparative immunity from the disease. He called in a colleague, who was no more certain. Finally the two took their patient in a cab to a specialist on such diseases. It was twilight, and the hall of the specialist's house was dimly illuminated. The famous practician, who was, by the way, somewhat short-sighted, came into the hall, caught a glimpse of the man, and without any further examination called out: "Take him away; small-pox!" *He knew just what to look for.*

Such facts as these should be in the mind of the teacher when reflecting on the nature-study lessons of the upper school. He has gradually to transform observation from an indiscriminate noticing of this and that point, to "an orderly conning over the visible and inferior creature," aided by ideas already possessed, and directed by a purpose connected with those ideas, *i.e.* the desire or curiosity to add to them. Too often the observation lesson deteriorates into a number of vague and random replies by the boys, to a number of equally vague and random questions by the teacher. Instead of this, the early part of the lesson should be so arranged that a definite purpose springs up, *is clearly stated,* and works itself out through the succeeding observations. Thus, suppose the lesson is on a fish. The children know that this animal lives in water. The teacher, therefore, can propose that the pupils should note all those properties of the fish which enable it to live in water. The more he can get them really curious to find out these things, the more successful his lesson is likely to be. For the purpose must be *theirs,* not merely one in *his* mind.

Unless a real, live purpose is stirred in their minds, the lesson will be dull and unprofitable. Even if the same observations are attempted as in the case of the lesson with a definite purpose, they will not be undertaken with the same pleasure and profit. But when the children are really in quest of something, these same observations will be suffused with meaning at every stage. Thus the breathing apparatus of the fish will be examined not merely because the teacher requires it to be observed, but because the children want to find out how it enables the fish to breathe in water. And the same purpose will infuse interest into the examination of its means of locomotion, its colour, shape, and covering. In such processes as this, *reasoning* will be developed. Indeed, the highest type of observation lesson will be a species of scientific investigation. But the nature of reasoning must be reserved for fuller consideration in a separate chapter.[1]

Reverting to the case of the student analysing his salt, we note that the purposeful observation in this case involves not merely an examination of the thing as it is, but many modifications of it in order to find out what mere scrutiny would never discover. This more active type of observation is usually called *experiment*. It is performed in many science lessons; and, once again, the pupils themselves should participate to the full in it.

Though observation involves higher or ideational processes, we have begun its consideration in this chapter because it depends upon, and takes its rise in, perception. Most of the lower animals seem to remain for ever in the world of perception. But in the human being, higher centres are aroused very early in life, and the activity of these is correlated with those mental processes which we have called ideas. "Gradually, ... he acquires ideas of things, their sizes and shapes, and grouping them together he begins to form some conception of the outer world and of the various 'things' which he sees around him."[2] With the nature and development of these conceptions or

[1] Ch. IX. See especially pp. 169-172.
[2] Mumford, *The Dawn of Character*, p. 30.

ideas we shall deal in the chapters on Ideation. In other words, we shall study the process of observation on its upper or ideational, as distinguished from its lower or perceptual, side.

But before doing this, it is necessary to study some important results of perception—those revivals of perceptual experience which are known as *images*.

Questions on Chapter V.

1. State clearly what is meant by *perception*. What is its relation to *sensation*?

2. Why is it necessary for children to handle the things which they deal with?

3. What is *observation*? Distinguish a higher and a lower kind, giving examples.

4. What is the object of nature study as a subject in the school curriculum? Why should it develop into natural science as the pupil grows older?

5. Illustrate the truth that perception and skill develop together.

6. Why should a child be required to state clearly what he sees during an observation lesson?

7. What is meant by "the training of the senses"?

8. What do you understand by the statement that handwork is a *method* rather than a subject? In accordance with your answer specify the place of handwork in the Time Table of the School.

CHAPTER VI.

IMAGINATION.

WHEN a lighted torch is swung round rapidly, it appears like a circle of flame. The nerve impulses produced by one position of the torch persist some time after the flame has left that position, and if the torch is moving rapidly, it will get back a second time to a given position before the nervous impulses due to its last presence in that position have ceased. This of course applies to every point round the circle described by the torch. Such an experience brings home to us a fact which we might otherwise ignore, viz. that nervous excitations, once begun, go on a little longer than the stimuli which produce them. This is particularly the case when light is the stimulus. As the nervous excitations in the cortex are thus continued, their mental concomitants—the sensations—persist also. And the mental object elaborated on the basis of sensation may thus exist for a short time during which there is no external object to correspond to it. Unless we knew from other considerations (having seen, for instance, that only one torch was employed at the beginning and that there was still one at the end, when the rate of revolution slackened), we should see and believe in a circle of light.

Such persistence of a percept is called an *after-image*. In the case of visual after-images, we often notice a peculiar change supervening. What was light becomes dark, and *vice versa*. What was blue becomes yellow, and *vice versa*. What was red becomes green, and *vice versa*.

Many will call to mind an advertisement of Pears' Soap depending on these facts. When the image has changed in this way, it is called a *negative after-image.* The alteration is probably due to changes in the nervous tissue. These changes go on independently of our attention. After looking at the flame of my lamp I cannot avoid getting a dark blur which prevents me for a time from seeing clearly any other objects at which I choose to look.

But I can also, immediately after looking at an object, call up in my mind by an effort a vivid representation of it approximately just like it appeared. This is not due to the persistence of the original sensations, but to a definite act of attention. As soon as I give up my effort, the image goes. Such an image is called a *primary memory-image.*

When I have attended carefully to an object, or when I have seen it a number of times, and paid some attention to it, I can often recall a more or less imperfect representation of it, even after a considerable interval. This is usually called by the single word *image.* It is probably due to the fact that some of the same nervous centres of the cortex are re-excited. The whole chain of impulses of course is not the same, for the sense-organ is not stimulated by the presence of the external object. The excitation of some of the same nervous centres is set up by impulses coming from other centres. (We shall see how these impulses arise in the chapter on Memory.) It is possible, therefore, to include these other centres, or some of them, with those of the original centres which are re-excited, and to speak of the new whole thus constituted as a *centre of imagery,* or as a *representative centre.*

An image is sometimes spoken of as a *revived percept.* We may adopt the term, so long as we remember that there are important differences between image and percept. We are seldom confused between the two. We know when we have a percept, and when we have only an image. If images were practically as good as percepts, we could live over the best moments of our lives again and again, and with almost the same enjoyment. Many of us do

get considerable pleasure by calling up images. But probably none would agree that they approach closely to the reality of the percepts.

Images lack the intensity of percepts. They are less distinct, being blurred and indefinite, and more or less wanting in many of the details which belong to perceptual experience.

Unlike percepts, they are independent of our bodily movements; I can close my eyes or turn my head, yet still retain my image.

Percepts are always surrounded by a "halo" of muscular and organic sensations which occur with them. Thus when I fixate an object with my eye, there are not only the sight sensations but vague kinæsthetic impressions, due to the movements in and around the eye, and more or less fused with the organic sensations. The image, however, is disconnected with such sensations, although some are always present in our total sensational experience of the moment.

Images are less stable than percepts, "flowing and flickering," as Dr. Ward says, like the gas-jets at a fête.

Lastly, the percept comes as a sudden "happening," on account of the physical stimulus which initiates it; the image in most cases develops gradually.

The word *image* in psychology is not reserved for revivals involving sensory elements of sight alone. It refers to the revival, however partial or imperfect, of any perceptual experience. Some individuals, indeed, have very little visual imagery, and depend largely on revivals of elements from the other senses.

The power to visualise varies very much. Some can recall things with great fidelity and with all their colours. Others get only a more or less hazy "black and white" reproduction. Others again get hardly anything worth the name of a visual image. Children as a rule visualise better than adults. As men grow old and depend more on *thought* (of which we shall speak later), there is usually a decline in their powers of visualising. Some famous thinkers have confessed to great poverty in this respect.

There is also considerable variety with respect to the *kind* of imagery habitually employed. Not very long ago it was thought that in remembering the same objects we all had the same kinds of images. Thus, it was thought that if a number of people saw a new word, attempted to learn its spelling and then later endeavoured to recall that spelling, they would all have the same kind of images to help them. It is only in recent times that we have come to see the falsity of this. When we interrogate people who can introspect, we find wide differences. Some remember chiefly by reviving a visual image of the word. Some depend largely on auditory images, and prefer, when learning, to spell the word, so that their auditory sense is active. Others, again, prefer to spell the word, not so much for the sounds which they hear as for the motor sensations derived from the organs of speech. Some rely on a combination of imagery from two or more senses. Thus many would get images derived from both the auditory and muscular senses. If the word is written down as a further means of fixing it, this may impress still more the visual form, but at the same time it awakens the muscular sensations involved in writing.

Most of us depend largely on several senses. But often one sense is predominant. We recall more satisfactory images in this sense than in the others. Accordingly, people have been classified into—(1) *visiles*, those obtaining and depending largely upon visual images, (2) *audiles*, those depending largely on images derived from the sense of hearing, (3) *motiles*, those depending largely on motor images. These are the chief varieties. *Motiles* usually depend also on touch, and are therefore also *tactiles*. All blind persons belong largely to this type, while the images of a blind-deaf person like Laura Bridgman or Hellen Keller must be almost entirely of this nature. The sense of smell, however, in a few persons, has been known to furnish a rich variety of imagery. These might be called *olfactives*. Zola, the great French novelist, was of this type. Almost every object had for him its distinctive smell. Towns, streets, and even the seasons of the year were distinguished in his mind by

their smells, and the images of these smells could be revived by him with great vividness and distinctness.[1]

Richness of imagery in connection with a given sense must imply highly developed perception in that sphere, since our images are all derived from perceptual experience. But the reverse is not true. Fine perception is not always found to produce fine imagery. There are many persons, for instance, who see things very well and note all their details with great accuracy and swiftness, yet cannot obtain good visual images afterwards.

These facts with respect to imagery are of great significance to the teacher. He should be ever on the alert in his teaching to appeal to as many senses as possible. This is necessary, not only because one sense helps another, or because, if one fails, another may be successful, but because the pupils are of several types. In the majority, visual imagery takes the lead. But some will be audiles, and others motiles and tactiles. Thus, in introducing a new word (e.g. *oxygen* in a science lesson), the wise teacher will not only say it himself, but will write it on the blackboard, so that the pupils see it. He may then cause them to repeat it after him, so that they may both hear it again and get the muscular sensations involved in pronouncing it. He may go still further, letting the pupils spell the word, and even write it for themselves.

This is a good example to illustrate the fact that many teachers are successful up to a certain point without any knowledge of psychology. Such methods of fixing a new name in the children's minds are used by many teachers because they have felt the need of them in their own case, or because they have picked them up from others (often quite subconsciously), and have realised their utility. But when once a teacher sees the reasons for these practices,

[1] Recent researches seem to point to the fact that usually in a given individual there is not a very great difference between the richness of imagery derived from one sense and that derived from another. Many seem to have good imagery *all round*; and some, especially those who do much conceptual work, seem to have poor imagery throughout, except, perhaps, for words.

he will not only employ them more systematically, but he will be able to apply the same principles to other portions of his teaching. However good his rule-of-thumb or intuitive methods may be, he will further improve them if he understands their *raison d'être*. *His teaching will become more intelligent.*

It is to be noted that whenever the pupils are called upon to do anything, whether in speech, writing, or spelling, they not only get further sensations (muscular) which may be of especial value to motiles, as well as of some assistance to the others, but the teacher is sure of their attention—at any rate while they are doing the thing in question. When I merely say a word to a boy, he may be looking at me, but I can never be sure how much attention he is paying. If I get him to repeat it, I know that he must be attentive; for the repetition requires considerable attention on his part. Hence these practices are not only valuable for the reasons already stated, but as a means of retaining or recalling attention. When a boy's attention wanders, the unskilful and tactless teacher will begin to "nag," and will possibly waste one minute in doing so (1 minute for 40 boys = 40 minutes in all). The skilful and intelligent teacher will ask that boy to do or say something connected with the matter in hand, thus regaining his attention without any real interruption to the lesson.

The word *imagination* may be used in psychology to designate *all* production of images. In ordinary speech the word is not usually employed in referring to such cases as we have been dealing with. It is reserved for the production of new combinations, which seem to go beyond the experience of the individual. Thus, if I call up an image of a house I have seen, the ordinary person would not say that I have gone through a process of imagination. He would say that I have merely remembered what the house was like. But if I figure to myself a new type of house which, as far as I know, has never yet been built, my mental process would be allowed by everyone—psychologist or ordinary individual—to be a case of imagination.

The ordinary person uses the word "imagination" *in opposition to* the memory of things actually perceived.

When I describe a house which I have seen, he will say that I have *not* imagined it. When I describe a house which I have never seen or heard of, he will say that I have *imagined* it. Even the psychologist who usually employs the *noun* "imagination" to cover both kinds of process is often tempted to use a different word in each case for the *verb*. He prefers to say that I *image* a house which I have seen, whereas I *imagine* a house which I have not seen or heard of.

We shall find that all cases of imagery, whether of things actually perceived beforehand or of things apparently invented by us, are dependent on the stock of images which we have acquired in perception. Hence the justification of including all under the general term *imagination*. To distinguish the two kinds of cases, we shall speak of *reproductive imagination* when percepts are revived approximately as they occurred, and of *productive* or *constructive imagination* when considerable changes are made, so that the resulting images are more or less unlike anything already experienced.

Productive imagination is of two kinds. I may frame an image of something which I have never perceived either (1) guided by another person's description, or (2) without any other person's guidance. In the former case, I may be said to exercise *interpretative imagination*; in the latter, *originative imagination*. Professor Sully calls the two *receptive* and *creative* respectively.

Interpretative imagination is continually being required, both in school and in the communications of everyday life. The good teacher is frequently engaged in "picturing-out" to the boys; in other words, he describes to them things which they have never seen. True, whenever he can, he shows pictures, or models, or specimens. In doing this he is not only making his teaching of the particular subject more thorough, but he is helping to lay that solid foundation of perception on which future imagination can be raised. But very early in the child's life it becomes necessary to make use of the perceptual experience already obtained. No individual can perceive everything. If he is to understand the world in which he lives, he must use

his imagination to fill up the gaps in his perceptual experience. His reading-books are full of descriptions and narratives which can only appeal to him if he is able to arouse in his mind images of his own past experience.

I get tea which is labelled with the name *Ceylon*. I have never been there, and probably shall never see the island. But I read and hear descriptions of the place, and can frame a more or less satisfactory image of what it is like. Some people who have read descriptions of places which they have afterwards visited have declared that the places corresponded very closely to the images which they had already formed. But we need not go to exceptional cases of this kind. I describe to a boy the way he is to take to get to a certain place. Following my words, he constructs for himself an image, somewhat schematic it may be, of the whole route.

In order to understand this process of interpretative imagination, let us examine an instance still more carefully. Suppose that I wish to tell a boy what the Crystal Palace is like, and suppose that I have no picture to show him. I know that he has seen Buckingham Palace, Nelson's Column, and the Palm House at Kew. I refer to all three, and he calls up images of them. I now lead him to combine elements of each, and thus to form a new image.

Buckingham Palace will give approximately the size, the Palm House will contribute the kind of material used in construction, and Nelson's Column will give some idea of the two towers at the extremities. Thus I may say to the boy: "The Crystal Palace is a big building like Buckingham Palace, but it is made of glass, like the Palm House at Kew. At each of the two ends is a round tower like Nelson's Column, but made of glass, and with no statue on the top."

The boy is then able to frame some sort of image of a thing which he has never seen. If I go on with my description, I may make his mental picture more like the original by calling up images of other things which he has seen, and incorporating parts of them in the new construction. Thus I may refer to the roof of the Central

Transept, and liken it to that of St. Pancras Railway Station.

All such description involves the calling up of images of things which the boy *has* perceived, the selection of certain elements from those images, and the union of those elements into a new composite image which, in its entirety, corresponds to nothing which the boy has seen. It is not, of course, maintained that these selections and combinations are separate processes definitely experienced as such by the boy. They go on, in more or less intimate connection, as my description proceeds.

The chief point to be noted is that I am completely dependent on what the boy has perceived. If I begin to use words which, though they call up images in *my* mind, do not do so in *his*, I fail to make myself understood. Either the boy calls up irrelevant images which contribute false elements, or else he calls up none at all in this part of my description. His composite image may then be very imperfect and vague, or he may give the whole effort up in disgust, and allow his attention to be attracted to something else.

At such points as this, the unintelligent teacher often complains of a boy's inattention, and blames the boy for lack of interest. How important, therefore, it is that the teacher should have a good knowledge of the past experience of the boys, so that he may be sure that the words he employs really call up images in their minds! One of the principal reasons why so many teachers fail to hold the attention of boys to their narratives and descriptions is that they do not *begin at home.* They do not see that in these matters, we must start on our excursions from what the boys already know.

A recent educational writer states that "'Known to unknown' has long since passed into the realm of cant and shibboleths."[1] But, interpreted in the manner here indicated (and this, by the way, is only one of its meanings), it is one of the most important principles of teaching. Especially with young children, we must be careful, in describing and narrating, to connect the things which are

[1] Professor J. W. Adamson, *The Practice of Instruction*, p. 49.

far off in time or place with the daily lives of the children. We must compare those things with objects which the children have themselves perceived, thus forming images of the strange things from elements already existing.

Originative or *creative imagination* is the highest type of the process we are considering. It involves the construction of a new composite image without any direct aid from another person. The most splendid types are usually considered to be the creations of the poets and romancers. Milton's *Paradise Lost*, for instance, is the result of a colossal effort of creative imagination. Yet even this is manufactured entirely out of elements derived from perceptual experience. It is impossible to demonstrate the truth of our statement by examining such a work in detail here. All we can do is to take a simple example of the same kind of process, and to show how this depends entirely on the actual experience of the individual.

We have all heard people say that so-and-so was born with a silver spoon in his mouth. As we use the phrase day by day, we probably pay little attention to the imagery which it can excite. But the man who first lighted upon it must have had a more or less definite image of a baby coming into the world with the expensive article in his mouth. Such a thing could never have occurred in his experience. But he had seen both babies and silver spoons. He brings these together under the influence of a dominating idea—that of wealth and ease. Wealth and ease are connected in his mind with such things as silver spoons. The wealth and ease attending the upbringing of a certain favoured individual of his acquaintance cause him, therefore, to think of a silver spoon. He has perhaps an image, based on past experience, of a baby with *something* in his mouth. Under the influence of his dominating idea, he substitutes the silver spoon for that thing in his image. He thus gets a new combination which has never existed in reality, though its parts are all derived from actual experience.

The constructions made by some imaginative writers are so novel and gigantic that it is sometimes difficult to believe that they owe all their parts to the experience of

the maker of them. Yet so it is. The novelty consists in the rearrangement; and this takes place in obedience to some governing idea or purpose. We may liken the process to what takes place in the world of external objects. Science proclaims that man can neither create nor destroy one particle of matter. Yet he makes many wonderful things. These, however, are only rearrangements of what already exists.

From time immemorial men have been charmed by the creations of poets and tale-tellers. But these enjoyments have often been looked upon by the more serious members of the community as of secondary importance. They have often been regarded as idle wanderings of the mind, with no real utility for the business of life. And the feeble attempts of children in the same sphere have been viewed with disfavour, if not with positive condemnation. The "play of fancy" was, until quite recent times, regarded as something to be discouraged, both in children and adults.

Now it is quite true that much day-dreaming has been positively harmful. Men have lost themselves in the world of imagination, and have failed to achieve anything in real life. On the other hand, however, many have derived sufficient inspiration from their dreams to nerve them to accomplish much which they would not otherwise have done.

It is beginning to be recognised that, within due limits, this sport of the imagination is to be encouraged. For this creative imagination is not to be confined to the realm of literature. The power of spontaneously combining images into new wholes is at the root of many of the greatest achievements in science and the industrial arts. The hypotheses of the scientists, the ideas of the engineers, the plans of the great architects, all owe much to the power of imagination. A Newton begins by imagining the moon falling towards the earth, and ends with the law of gravitation. A Stephenson imagines the locomotive, and revolutionises the traffic of the world. A Christopher Wren imagines a new St. Paul's, and gives us one of the finest buildings of modern times.

And in the school-room, a vivid imagination will help

considerably in solving a problem which relates to a complex series of events. The boy who can see with his mind's eye the larger number of men setting to work on the wall spoken of in the problem, who can watch them bringing up their loads and laying their bricks with greater rapidity, will be in a better position to understand that they will finish the work in a shorter time than the boy who has a faint notion of "more men—less time." Of course, the teacher can do much to awaken such imaginative processes by choosing interesting and real examples, and by talking about the sums in a pleasant and encouraging manner. A large number of boys fail to attack their problems with intelligence because they never really imagine the circumstances described.

All the great schemes which have been realised owe much of their success to the mental pictures which have been framed in the minds of their initiators. And in the humbler details of life all the little plans for improvement which lead to gradual progress in the various branches of human activity are due in large measure to new combinations of imagery which are framed under the influence of some dominant idea or purpose.

It is not surprising, therefore, that imagination is recognised to be a most important branch of the mind's activity, and that, in particular, the originative type is highly esteemed. We hear a great deal now in educational lectures and books on the cultivation of the imagination. We cannot, however, hope for the ripe fruits of "creation" until the tender plant of reproductive imagination has been carefully tended. We must first try to encourage the processes of perception and observation. These usually produce a plentiful supply of images. There are some children, however, who seem largely satisfied to remain on the perceptual plane. These especially require some assistance in developing their powers of imagination. And even the others can be helped considerably by the teacher.

How is this to be done? By inducing children to make definite efforts to reproduce what they have observed. This is done by requiring accounts and descriptions of

their observations, as well as drawings and rough sketches. Such means are used freely in many quarters *while the object is still present to the child.* This, however, chiefly tends to render the *observations* more definite and accurate. It is true that if the observations are thus made with a maximum of attention, their traces will remain more firmly fixed, so that subsequent imagination will be more successful. And the practice is to be highly commended on that account. The teacher should not be satisfied to let the children look at objects. He should require them to tell what they see. But more is necessary if reproductive imagination is to be definitely encouraged. The children must also be accustomed to describe or draw what they have seen, *after an interval has elapsed.* In order to succeed in such exercises, the children will need to call up images.

As we have already shown, children are exercised in interpretative imagination whenever they listen to, and are able to understand, a description. And we may repeat once again the caution that the teacher should be careful to use words which will most probably call up the required images in the children's minds. He can never be quite sure that he has succeeded, especially in the more complicated cases. Hence the need of ascertaining what kind of effect he has produced in the children's minds. Drawing and description on the part of the children will help him here also; *especially the former.* Not nearly enough use is made of drawing in this connection. Teachers are too prone to consider that drawing is only to be employed when the object is present. In acquiring preliminary skill in the art, this is often necessary. But as soon as any skill is acquired, the art can be put to other uses. If, after a tale has been told, or a description given, the children are required to portray what they have imaged, the exercise will not only be a valuable means of fixing what has been recounted to them, but it will afford the teacher an opportunity of getting some idea of what has been produced in the children's minds in response to his words.

The method can very well be employed also with older

pupils. Professor Adams has given some striking instances of the utility of this check on imagination. He refers, for instance, to some training-college students who, having read *Robinson Crusoe*, were required to draw a sketch of his first shelter on the island One drew a Union Jack as the covering for the roof. Asked for the justification of this, he referred to the passage in which Crusoe asserts that he covered his shelter "with *flags* and large leaves of trees, like a thatch." The word *flags*, instead of calling up the image of broad leaves, had suggested the coloured cloths which we all might imagine if the word occurred in some other context.[1] Now it was only by a sketch that this error was found out. And if teachers would employ drawing, not only for its usual objects, but as a means of expression of ideas and images, they would discover many vagaries in the minds of their scholars.

There is no need here, of course, to worry about the quality of the drawing as such. Assuming a certain ability to draw, we merely make use of it. Thus, after the boys have read or heard a description or narration of some literary value, they might frequently be asked to express the images which have been formed in their minds.

It is not necessary to limit this kind of expression to drawing. Modelling in clay or plasticine will sometimes be a more convenient and more interesting alternative. Some scenes, too, may be re-enacted by dramatisation. Of this we have already spoken in another place.

Few teachers venture to push on their boys into the field of originative imagination. Yet, if we are prepared to give sympathetic appreciation to the efforts of immature minds, we shall find here a sphere of activity in which surprising progress can be made. The composition lessons will perhaps afford the most suitable opportunities for much of this work. It is not advisable to hurry the boys very abruptly from the interpretative to the creative sphere. There may be a series of gentle transitions. Thus a story may be told up to a highly interesting point and

[1] *The Herbartian Psychology Applied to Education*, p. 217.

then held up, the boys being asked to give their own accounts of the ending. (They may afterwards be rewarded by allowing them to hear the author's conclusion.) A series of pictures illustrating various events in a possible story may on another occasion be shown to the boys, and they may be asked to construct a story on the basis of those events. Later a few persons and things may be mentioned, and the boys can be asked to construct a story introducing the people and objects referred to. Still later, the general theme may be all that is given. They may be asked to write a story on war, one on sport, one illustrating the evils of intemperance or the advantages of perseverance. Lastly, from time to time they may be allowed to write an original story on any subject they please.

We have already noted the use of drawing as an aid to interpretative imagination. It may also be used to further the originative variety When children have drawn leaves of different shapes from *copies*, they may be encouraged to combine them in *new combinations*. When they have had some practice in dealing with various colours and forms, they may be asked to arrange them to form original designs. Much work of this kind has been done in some of the best schools, and some of the results obtained are surprising in their excellence.

There are other spheres, besides those of composition and drawing, in which some scope can be given to originative imagination. But teachers are, as a rule, so anxious to get the boys through the courses prescribed that little attempt is made to cultivate originality, though the word is on every tongue. When an educationist proposes *heuristic* methods—methods in which boys are left to find out ways and means for themselves—he is met by the objection that they can do very little indeed in this way, that life is short and that much has to be acquired rapidly if we are to profit by the knowledge acquired by our predecessors. All this is quite true. And for a teacher to attempt to get his boys to discover all things by themselves would be the height of folly. But this is no reason why *some* scope should not be given for inventiveness. The teacher might, for instance, pause in an

experiment and give the boys an opportunity of reflecting as to how the result aimed at is to be achieved.

Sometimes, perhaps, he will find that, although he himself has learned the way to perform it from a book, there may be some boy who can hit upon the course of procedure unaided. We shall, of course, find few geniuses among our pupils. But we shall find much more inventiveness than we expect, if only we give some opportunity for its development. The keen student of children may sometimes come across a child for whose powers he will feel a wholesome respect. The fact that teachers deal with immature minds tends to make the less intelligent of them come to consider all their pupils as inferior to themselves in mental power. It is salutary to remember the example of a teacher who made a practice of bowing respectfully to his class, giving as his reason the probability that, among so many, some at any rate were likely to be his intellectual superiors.

In much of what has just been said we have overstepped the bounds of imagination, and trespassed into the field of reasoning, which will be dealt with in detail later. But this is of little consequence if the truth is brought home that the inventiveness displayed in creative imagination and that of reasoning are often intimately connected. Imagination often helps reasoning. In creative imagination we are indeed under the dominance of ideas (which are not the same things as images). But our images play a large and important part. In reasoning, ideas are the supreme factors, and determine the whole process, whether images are present to help or not.

Many readers will have felt, especially during the perusal of the last remarks, that productive imagination, both receptive and creative, and especially the latter, involves much more than the reproduction of imagery and the combining of certain portions into a new whole. In speaking of creative imagination, for instance, we have referred to a dominant *idea*. Why are certain portions of the reproduced imagery selected and others discarded? The play of mere imagery will not account for it. In interpretative imagination the words used by the speaker

or writer do indeed call up imagery. But they do more. They constitute a framework of *ideas*. These involve a direction of attention to certain relations or connections subsisting among the parts of the whole to be constructed. And to satisfy all the conditions laid down by these relations, only certain parts of the reproduced imagery can be selected and combined. To put it in another way, the ideas together form a network which catches or retains only certain portions of the images which are aroused. In interpretative imagination this ideational network is given with the words of the speaker or writer, provided always that the person hearing them understands their meaning. In creative imagination these ideas are evoked by, or in connection with, the dominant idea which has taken possession of the mind of the composer. *Why* they should be thus evoked cannot occupy us now. The laws which govern the suggestion of both ideas and images will be dealt with in a later chapter (Memory). Meanwhile, it is necessary to study the nature of ideas as distinguished from images. This will, accordingly, be the subject of the next chapter.

Questions on Chapter VI.

1. What is the psychological meaning of the term *imagination?* Distinguish it from the meaning of ordinary speech.

2. What are the various kinds of imagination? Which kind is active in the mind of a person describing his holiday, and which in that of the person listening?

3. What do you understand by *originative* or *creative* imagination? Give some instances of it which might occur in school.

4. Why should the teacher attempt to develop the imagination of his pupils?

5. How may imagination be cultivated in school?

6. What is the difference between the imagination of Milton in writing *Paradise Lost*, and that of the student who reads and appreciates it?

7. Is there any sense in which a good work of fiction can be called true?

CHAPTER VII.

IDEATION (I.).

IN dealing with both observation and imagination, we have had to refer to the part played by *ideas* or by *thought*. We have attempted to describe the "lower" processes of mind with a minimum of reference to this higher power of ideation, or thought, or *conception*, as it is sometimes called. It has, however, been obvious to the intelligent reader that we were only dealing with one aspect of those processes—a most important one, it is true, but not the only one. In the mind of the adult, and comparatively early also in the mind of the child, percepts and images are overlaid and permeated by "higher" or ideational processes. And it is now our business to examine as thoroughly as possible the nature of these ideas, or *concepts*, as they may be termed.

What, then, is an *idea*? We can best indicate what it is by referring to the most frequent way in which it occurs. Whenever we use or understand a word, there is involved a thought, or, to put it in another way, the turning of our attention in a definite direction. Thus, when I speak of a *blackbird*, there is one thought—that of a particular kind of bird which is familiar to me. When I speak of a *black bird*, there are two directions of attention—(1) to what is meant by *black*, and (2) to what is meant by *bird*. These two acts of attention do not remain separate. They immediately combine to form one more definite thought, or one more specific direction of attention. *Black* by itself or *bird* by itself might arouse a thought, but the attention would be ready to wander over many things—over all black things in the one case, over all birds in the other. The two together define or direct my thought into one more definite channel. It is like fixing the position of a point

on a square surface. If I say it is three inches from one side, the attention can wander all along a line drawn three inches from that side, and parallel to it. If I say that it is two inches from an adjacent side, the attention would, if this information alone were given, wander along a line drawn two inches from that other side and parallel to it. But the two directions taken together limit the position to one, and only one, point—that of the intersection of the two lines.

We have taken a case of two directions of thought only for the sake of simplicity. But often there are many thoughts which combine to cause convergence in one very definite direction. Thus, if I speak of *the present Chief Inspector of Elementary Education*, there are a number of general notions which together direct my thought to one, and only one, man. If I omit one or more of the words, the direction of attention is thereby rendered less determinate.

By this time the reader may be somewhat confused. He may say that when he hears or uses the word *blackbird*, for instance, the *image* of a blackbird comes up in his mind. And he may ask: "Is this image, then, the *idea*?" If the answer were in the affirmative, there would be no difference between the idea and the image. Good visualisers would probably always get some sort of visual image with a word of this kind. The concept, or idea, however, does not consist in this particular "picture" as such, *but in the direction of thought which arises in connection with it.* I am not engrossed in the mere image, but *I am thinking of something*, and this thing is certainly not an image in my mind. I am thinking of a *blackbird*; I am not merely experiencing the image.

"*The sense of our meaning is an entirely peculiar element of the thought.* It is one of those evanescent and 'transitive' facts of mind which introspection cannot turn round upon, and isolate and hold up for examination, as an entomologist passes round an insect on a pin. . . . The geometer, with his one definite figure before him, knows perfectly that his thoughts apply to countless other figures as well, and that although he *sees* lines of a certain bigness,

direction, colour, etc., he *means* not one of these details. When I use the word *man* in two different sentences, I may have both times exactly the same sound upon my lips and the same picture in my mental eye, but I may mean, and at the very moment of uttering the word and imaging the picture know that I mean, two entirely different things. Thus when I say: 'What a wonderful man Jones is!' I am perfectly aware that I mean by man to exclude Napoleon Bonaparte or Smith. But when I say: 'What a wonderful thing Man is!' I am equally well aware that I mean to include not only Jones, but Napoleon and Smith as well. This added consciousness is an absolutely positive sort of feeling, transforming what would otherwise be mere noise or vision into something *understood*; and determining the sequel of my thinking, the later words and images, in a perfectly definite way."[1]

This "added consciousness" arises in connection with both percepts and images. When we have once passed the first few months of our existence, it attaches itself to all our cognitive experience. When we attend fully to anything, we do not merely get a percept of it, the mere cognition of *an* object; we have in each case, whether of perception or of imagery, the cognition of *some particular object*, which we recognise. So long as I fail to concentrate attention on it, my desk is merely *an* object, which I avoid in passing, or at which I sit down when I wish to write. But as soon as I attend definitely to it, it becomes *my desk*. To get to know it in this way, I have had much experience in the past connected with it. And in connection with that experience, a higher cortical centre has been excited and developed.[2]

We may, indeed, speak of two such centres, though they

[1] James, *Principles of Psychology*, Vol. I., p. 472.

[2] It is not admitted by all psychologists that there is a *separate* centre for the meaning or idea. Meumann, for instance, writes: "Further, one of these centres, the conceptual centre (or centre for the ideas of objects), is not authenticated, but constructed out of pure theory, and I consider it unlikely that a separate centre of this kind exists; the obtaining of word-meanings can just as well be connected with a co-operation of the various centres of sensation and perception. . . ." (*Vorlesungen*, Band II., p. 269.)

are so intimately related that they usually act in close connection. The two centres are those of conception and of speech. We cannot, as a rule, speak or hear a familiar word without at once directing attention to its *meaning*, *i.e.* the concept or idea which is connected with it arises in our minds. And we cannot, as a rule, think of a meaning without the corresponding word arising at the same time. In a few cases there may be a hitch in the process. But usually idea and word go together in consciousness. We may also have in consciousness at the same time a percept or an image of the thing or things signified. But that is not essential. Some things to which we direct our attention may have no percepts or images corresponding to them beyond the percepts or images involved in the word or its revival (e.g. *virtue*, *wisdom*, *courage*). And even where images of the things are easily possible, some people do not have them. The word with its meaning will always serve. The two are so closely connected that Professor Max Müller preferred to speak of the *word-thought*.

The nature of the speech centres, and at the same time their close relation to the ideational centres, may be more clearly understood by a little further elucidation. A word in the first place is a combination of sounds. As such it gives rise to excitations in a sensory area of the cortex. This area has been shown by Wernicke to be located—under normal circumstances—on the left side of the cerebrum, just below the fissure of Sylvius (marked *Hearing* in Fig. 15).

But very early in life the hearing of a word leads to imitation of its sound. This brings into play movements of the organs of speech. These movements are effected by means of nervous impulses which take their rise in a motor area of the cortex. This area has been shown by Broca to be located—under normal circumstances—also on the left side of the cerebrum, but in this case in the region in front of the fissure of Sylvius and close by the end of the fissure of Rolando (marked *Face* in Fig. 15).

Further to the back of the cortex is another area which is excited in connection with the sight of a word (marked *Vision* in Fig. 15). And in yet another part of the cortex (marked *Arm* in Fig. 15) is an area from which impulses

go to the muscles of the hand and arm, and which is thus connected with the movements involved in writing a word. All these centres may be involved—with the educated adult —in the occurrence of any word, though probably the part played by each varies greatly with different individuals, and with the same individual at different times (*e.g.* according as one is speaking, or listening, or reading, or writing from dictation, or writing spontaneously, and so

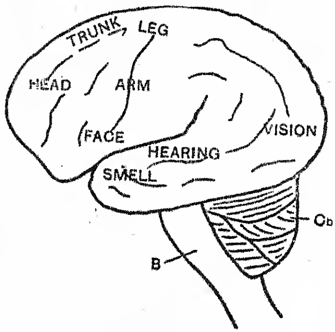


Fig. 15.—Diagram of the Left Hemisphere of the Brain showing Motor and Sensory Centres.

Cb = Cerebellum ; *B* = Medulla Oblongata or Bulb.

on). It must be remembered that they become connected together by nerve-fibres in such a way that when one is aroused to activity the others are to some extent excited also—giving rise to more or less vague revivals of past experience. But in addition to all this, other centres, *connected with the meaning of the word*, are usually excited. Images and ideas totally different from the word itself usually arise and play the predominant part. In a large number of cases, the centres concerned in these processes cannot be definitely located. For the sake of definiteness, however, we may speak of them as the ideational or thought centres. And the accompanying diagram (Fig. 16)[1] may help to give some notion of the com-

[1] Adapted from Störring.

plexity and interconnectedness of the word-thought apparatus in the brain.

The diagram is probably much more simple in form than the actual mechanism. The *one* centre labelled *Idea*, for instance, may be constituted out of *a large number* of interconnected sub-centres. Now when all the connections between the various centres have been developed, the excitation of one of them tends to arouse some or all of the others. And the corresponding mental states are, of course, aroused. "The fact is that meaning is part and parcel of word-sound and of word-utterance, as these ordinarily occur in reading and in thinking; that is, what we take for word-sound and word-utterance is largely word-meaning. And as meaning inheres in or is fused with the word's sound or utterance, so to get the meaning we naturally utter the word, incipiently for the most part, actually when the meaning is obscure."[1]

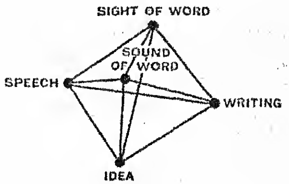


Fig. 16.

From this short excursion into the realm of physiological psychology it is evident that, though we speak glibly of definite centres for this or that process, the matter is far more complicated. "There is no 'centre of Speech' in the brain any more than there is a faculty of speech in the mind. The entire brain is at work in a man who uses language."[2] When, therefore, we speak of speech centres as if they were separate, clearly defined portions of the brain, it must be understood that we do so only for the sake of simplicity. And the same remark applies to all that has been said, in previous chapters as well as in this one, with regard to special and definite centres for perception, imagination, and ideation. Probably no such definite centres will ever be found. Still it conduces to clearness of thought in these matters to avoid the immense com-

[1] Huey, *The Psychology and Pedagogy of Reading*, p. 164.
[2] James, *Principles of Psychology*, Vol. I., p. 58.

plexity which actually exists by reference to definite and separate centres in each case, and we shall continue to do so when it serves our purpose.

It must not be imagined that the higher centres of which we have spoken exist ready-made in the brain. We are not born with the power of ideation, or of speech. But the necessary tracts of the cortex soon grow, and are ready for development. This development, however, cannot take place of itself. It can only occur with experience. The lower centres of sensation, and to some extent those of perception, seem to be born with us. They begin to act with almost machine-like regularity. This is particularly noticeable in the case of the lower animals, which appear to perceive things without any previous experience.

The higher centres of speech and of conception develop slowly, and depend largely upon experience. Hence the need of systematic observation lessons. The wonderful development which takes place distinguishes man from all the other animals. It is, of course, not entirely due to the experiences provided. Otherwise there would be no reason why *animals* living in a civilised environment should not develop in this way. The necessary cortical tracts must be in existence. "Mental development cannot be fully explained by experience: there is an organic development upon which the mental development rests and without which the process would be impossible. This organic substratum varies enormously, and accounts for much of the diversity in the rate and nature of mental development."[1]

And it is only the human brain which grows to such an extent as to produce an adequate substratum for a large number of such ideas. When once it exists, and the brain is in a healthy state, the requisite kind of experience leads to that development which makes the higher forms of ideation possible. A person might have a brain *capable* of the highest degree of development. But if he is not put in a civilised environment, these higher centres will not be developed. We hear, for instance, of the wild boy of Aveyron, who had been abandoned in the woods at an

[1] Mumford, *The Dawn of Character*, pp. 31, 32.

early age, and who had managed to survive without the usual attention bestowed on children by their parents. When discovered, he was speechless, and, from the human point of view, almost devoid of any powers of discrimination.[1]

The speech centres probably develop more rapidly than the ideational. Words, to begin with, are percepts—auditory ones in the case of the young child, though they soon become kinæsthetic also as he learns to produce them by imitation. There is, probably, something of the ready-made in the cortical centres connected with speech. A child begins to babble very early, making all kinds of sounds and taking great delight both in hearing and in uttering them. He has a special tendency to listen to sounds, and to strive to imitate them. He probably succeeds in doing this in many cases before any ideational meaning is attached to them, *i.e.* before his conceptual centres have developed to a corresponding extent.

Fond parents, of course, often attribute to him all the ideas which *they* have in using the same words. And some teachers seem to think that if they can get the child to repeat a form of words, he must thereby mean the same things as *they* understand when using those words. But although some meaning soon arises in his mind, his early words are similar to those of the parrot—mere imitations of sounds, evoked in a perceptual way. The proud mother is very much like the man who asked a parrot exposed for sale whether he was worth his price. The parrot replied "There is no doubt about it." He was eagerly captured and taken home, where, however, he disappointed his purchaser by revealing the fact that this was all he could say. After many attempts to get something new from the bird, the man cried out: "Was I not a fool to pay so much for you?" "There is no doubt about it?" came the answer. There was no ideation be-

[1] "Those who saw the *savage of Aveyron* at the time of his arrival in Paris know that he was much inferior, with respect to discrimination, to the more intelligent of our domestic animals."—Itard, *Rapports et Mémoires sur le Sauvage de l'Aveyron* (Paris: Alcan, 1894), p. 24.

hind these words. They were merely habitual responses to all kinds of auditory stimuli. The parrot, then, develops speech centres; but there are no correspondingly rich ideational centres which can be developed along with them.

As soon, however, as the infant begins to get control of words, they become a means of directing his attention to a multitude of objects. For his ideational centres are developing also, and their development is stimulated by the impulses which now arrive from the speech centres. Thereafter the two centres develop together, and become so intimately connected that they are best referred to as parts of one and the same centre.

Since ideas do not spring up by themselves in the mind, but require experience for their production, it behoves the teacher to know something of the experience which is necessary and of the way in which that experience acts in helping to produce the ideas. It is the teacher's business as an instructor to see to it that the child "learns something," in other words that he acquires a certain stock of ideas while at school. How then do these ideas arise? We shall get some light on the matter if we begin with the early ideas of the child and notice the kind of experience which is necessary for their production, then proceed to later ideas, again examining the experience required, and so on.

Let us, then, take one of the first things the child learns to recognise, to attend to, and to name. He soon gets to know his father. Now it is unnecessary to recapitulate a description of the processes of sensation and perception which are necessary as a beginning. Let it be sufficient to remind the student that the child may *perceive* his father very early in his first year, *i.e.* he may learn to adapt himself and his movements in a blind sort of way to his father's caresses, as indeed he would do to those of his mother or his nurse. But this might take place without any definite recognition of his father as a being distinct from all other beings, *as the same person* whom he had previously seen. In other words, he remains for some short time on the plane of *mere* perception.

It is not till the child gets this feeling of sameness that ideation or thought begins. As James says, "This

sense of sameness is the very keel and backbone of our thinking."[1] How can this peculiar consciousness be produced? It is evident that the child must perceive his father a number of times. Each perception would leave some trace on his mind and on his brain. If, however, the higher centres were not brought into play, the result would be a mere facilitation of the process of perception and of the adaptive movements necessary. This, for instance, is what probably takes place in the case of most of the lower animals. But in man higher centres exist and are excited—those of imagination and ideation. The child's *past* experiences of his father have involved the development of nerve centres whose excitation is accompanied by more or less distinct images—of his father's appearance, his walk, the sound of his voice, and so forth. The speech centres have also been modified by the name "Daddy" so often pronounced, and their re-excitation now may cause an image of the spoken word to arise in the child's mind.

But above all the ideational centre must be excited. It is no doubt intimately connected with the centres of imagery just referred to. But its excitation involves something more than mere imagery. It involves that "added consciousness," that "sense of sameness," which is bound up in the clear cognition of "Daddy." All the images referred to may only be in the nascent stage, they may not develop into sufficiently clear-cut forms as to warrant our calling them images. They may only form a vague "halo" round the central point of consciousness—the visual percept. But if the ideational centre is "touched off," there is more than mere perception, more than a series of vague images; there is that unique form of consciousness which, if the child could express it, would be "Hallo! Daddy once again!"

We cannot explain this added *idea*. It is unlike anything in the world of mere perception or of imagination. Yet it depends upon the processes of perception and imagination. If we introspect we can discover no mental content

[1] *Principles of Psychology*, Vol. I., p. 459.

beyond the percept or image, or both. The idea, then, is no third thing to be placed alongside of these. It is a sort of transformation of the way in which these are assimilated. Using a crude analogy, we may say that just as when iron is heated to a certain point it becomes luminous, so when sense-data are transformed into percepts, or are revived as images, and when these determine or help to determine a concentration of attention, there is a totally different phenomenon—the recognition of some definite object as identical with what has been perceived before. This is what we mean by the *idea*. This final result is usually fixed and made more definite by the use of a word. And the centres for this become so closely connected with those of the idea that this word becomes capable of arousing the idea at any time, whether any other percept or image is present or not.

Such an idea as that of "Daddy" is known as a *particular idea*. It is so called because it refers to a particular or concrete thing. It arises very early in the life of a baby, and it is found also in the higher animals. The delight of a dog in the presence of his master is fairly strong evidence that he recognises him as the same object as he has seen previously. Although the dog cannot use words, he appears to understand the meaning of some which are spoken to him. If his master's name is mentioned, he seems to act as if he had a clear idea of him.

Now even the particular thing changes from time to time. The baby's father may have a different coat on when he appears on a given occasion. He may change his tie or his collar. Sometimes he is seen sitting, sometimes standing, sometimes he is talking, sometimes he is silent. He may be seen side-face or full-face, or even from the back. But in the early stages these differences are not noted. If they are very great, the father is not recognised at all; he is merely perceived. If they are not very great, there is sufficient likeness to evoke recognition, and the differences are ignored. During a period of experiences of this kind the particular idea becomes more elastic. The essential points of likeness—still, however, without being attended to separately—stand out more clearly and evoke

recognition more readily in spite of differences in the percepts as they recur. In other words the particular idea is becoming a vague *generic idea*, though a generic idea of a particular individual. The points of likeness which determine recognition may be so few that another man in the distance may be taken for "Daddy." The child is vaguely conscious of similarity, though there is no definite cognition of what constitutes the likeness.

In a similar way the child may form generic ideas of classes of objects. He has formed, let us say, a particular idea of his own "pussy." And this has so far developed that he can recognise "pussy" in various attitudes. He may see other cats without definitely noticing differences and apply the term "pussy" to those also.

M. Itard, in relating his attempts at developing the intelligence of the wild boy of Aveyron (whom he named Victor), records a marked difficulty in arriving at the *generic idea* from the *particular idea*. "Thus every book which was not the one which he had in his room was not a book for Victor; and for him to decide to give it the same name, it was necessary that a perfect resemblance should make it appear identical with the other. . . . Whence arose this strange peculiarity? It was due, if I am not mistaken, to a keenness of visual perception which necessarily resulted from the special education given to the sense of sight. [Victor could not speak, and his hearing was defective.] I had so exercised this sense . . . . that between two similar bodies, there were always, for eyes thus trained, some points of disagreement which led him to believe in an essential difference. The origin of the error being thus discovered, it became easy to provide a remedy for it; it was to establish the practical identity of the objects by demonstrating to the pupil the identity of their use and properties; . . . . in one word, it was a question of teaching him to consider the objects no longer with respect to their difference, but according to their points of likeness."[1]

[1] Itard, *Rapports et Mémoires sur le Sauvage de l'Aveyron*, pp. 81, 82.

The processes of acquiring the particular and generic ideas which we have briefly examined, are included by many writers under *perception* and the *imagination* which follows it. It should be noted, once again, that we have limited the term perception to the simpler processes involving an awareness of external objects and the adaptation of one's movements to them, without definite recognition of them as things of which one has had experience before. It is obviously difficult to draw a clear line between the simpler and the more complex process. The former gradually merge into the latter. And this development begins very early. The mere sensori-motor reaction takes on more and more meaning, it becomes more and more familiar; in other words a particular or generic idea is developed, and tends to be re-excited whenever attention dwells upon the given object, whether presented as percept or image, instead of passing on to something else. On the physiological side we may suppose, as already indicated, that other cortical cells are excited by impulses proceeding from the cells concerned in the lower perceptual processes.

It matters little whether the term *perception* is limited to the simpler processes or extended to cover the higher ones which begin to develop from them almost as soon as experience commences. In whichever way we use the term, the chief thing is to understand exactly what we mean by it. As Hobbes says: "Words are wise men's counters, they do but reckon by them, but they are the money of fools."

The whole, therefore, of what has already been written in this chapter may be, and usually is, included under the rubrics of *perception* and *imagination*. It is, indeed, impossible to fix a definite boundary between perception and ideation. "For," as M. Itard writes, "so intimate is the connexion which unites the physical man [*i.e.* man as a mere perceiving creature] to the intellectual man that, although their respective domains appear, and are indeed, very distinct, all is confused at the boundaries between these two orders of functioning. Their development is simultaneous and their influence reciprocal. Thus while I was confining myself to

exercise the senses of our savage, the intellect took its share of the cultivation exclusively intended for the education of the sense organs, and according to the same order of development. It is obvious, indeed, that in training the senses to perceive and to distinguish new objects, I was forcing the attention to dwell upon them, the judgment to compare them, and the memory to retain them."[1]

But the young child very soon acquires ideas of a higher order. He not only has ideas of the objects which he sees and feels around him *as wholes*, but he gets ideas of their different qualities and of the relations existing between them. At first thought, it might be said that if he has ideas of them as wholes, these ideas must include the different qualities possessed by the wholes and at any rate some of their relations. Thus a child who has seen a kitten and a big dog playing together, who has thus acquired an idea of each of them separately, and also an idea of them together, might be said to have some knowledge of the smallness of the kitten and of the large size of the dog, as well as of the relation which we express by saying that the dog is larger than the kitten or that the kitten is smaller than the dog. In a sense he *may* be said to be aware of these things. But his awareness is a dim one: they are *implicit* in his particular ideas. They have to be dragged out, or *abstracted*, *i.e.* attended to *separately*, before they become *explicit* in his consciousness. When this occurs we get what are called *abstract ideas*.

In the early stages, however, children do not attend separately to the qualities of things. They apprehend them *as wholes*. This can be noticed even later, when they have already begun to notice many qualities separately. Thus the drawings of infants show that although they recognise animals very well as wholes, they fail to notice clearly all the parts. One of the best drawings in a class of infants of about four years of age showed a horse with no definite head and *seven legs*. The child had not attended to the legs sufficiently to note their number.

[1] Itard, *op. cit.*, p. 74.

(Most children of this age can count up to 4. At any rate they can distinguish between four and seven, even without counting.) To take another example, children taught *entirely* by the Look-and-Say Method of reading are able after a very few weeks to read simple sentences, although they are not aware of the letters of which the words are composed. In some cases they cannot spell the words at all.

How, then, do these qualities and relations, hidden, as it were, in the concrete things, ever come to be abstracted, or attended to separately? For simplicity's sake let us consider a thing as a bundle of qualities. Thus a piece of chalk is hard, rough, white, small, square in section, and is used for making marks. A ruler may be hard, smooth, brown, large, round in section, and useful to the child as something to hold and bang on the table. These two things are very different. But even here there is some quality common to both—hardness.

On the other hand we may have two objects which have many qualities in common, and few differences. Thus I might have two rulers alike in every respect except in colour, one being brown and the other black. Again there are many objects which have several qualities in common, and several which are different. Lastly there are some objects which are to all intents and purposes the same, and some which are totally different.

Now if the objects of this world did not include any which are partially alike and partially different, that is, if any two objects selected were either totally alike or completely different, it would never be possible for us to have any abstract ideas. We should never be able to single out qualities for special attention. Let the small letters of the alphabet represent qualities of objects, and for the sake of simplicity let us suppose each object to have only three qualities. We should have under the system referred to such combinations as *a b c—d e f—g h i—k l m—n o p*, and any combination might be repeated a number of times. But we should never get such combinations as *a b c—a e f—a d e—e g h—g h k*.

To take a concrete example, we could never have a piece

of chalk and a brown ruler in the system, for hardness is common to both. We might have a piece of chalk and something like the ruler in all respects except any in which it is like the chalk (*e.g.* it would have to be *soft*). Under these circumstances, we could get a particular idea of each object in our system. But we should never have an *abstract idea*, *i.e.* an idea of any of the qualities separated from the wholes in which they occur. "I think we may safely lay down at the outset this fundamental principle, that *any total impression made on the mind must be unanalysable, whose elements are never experienced apart.* The components of an absolutely changeless group of not-elsewhere-occurring attributes could never be discriminated. If all cold things were wet and all wet things cold, if all hard things pricked our skin and no other things did so; is it likely that we should discriminate between coldness and wetness, and hardness and pungency respectively? If all liquids were transparent and no non-liquids were transparent, it would be long before we had separate names for liquidity and transparency."[1]

But the objects around us are not like this. We get, for instance, things very much alike in most respects but differing in one or more qualities. Thus, cats are very much alike in size, shape, fur, and general habits. But one may be black, another white, a third tabby, and so on.

Further, as we have seen, even the same object, especially if it is a living thing, may appear very different at different times. But at first these differences are not specifically attended to. If they are great, the object is merely perceived, not recognised as familiar. If they are small, they are ignored. There comes a time, however, when the idea already formed of the particular object is aroused by a percept which, though sufficiently harmonious with the idea to have called it up, yet presents a difference which is *not* ignored. The idea and the percept do not fuse readily. A definite image of the thing as previously seen may be evoked, and attention may flit backwards and forwards between this and the percept,

[1] James, *Principles of Psychology*, Vol. I., p. 502.

thus bringing out the points of difference. The smooth progress of experience is arrested, and the necessity for further thought arises. This may occur either in connection with a new percept of the same thing (*e.g.* Daddy may have his face covered with lather for shaving) or in connection with a percept of a new member of a class of things (*e.g.* a strange cat). In either case the process will be of the same kind. We will take the latter as our instance. But it must be remembered that in describing what takes place we are not planning definitely what always occurs. We are merely attempting to give some notion of the process which supervenes. And in doing this, we shall for the sake of simplicity describe the business as far more "cut and dried," far more exact, far more explicit, than it would occur in the still very vague consciousness of the infant.

Suppose, then, that the child has only made acquaintance as yet with one cat—a black one about the house. He develops, after considerable perceptual experience, an adequate particular idea of this cat. Although, in the formation of this idea, the colour has an influence it is not attended to separately; the child is merely familiar with *the whole.* But at length he perceives a *white* cat. The general appearance of this creature awakens his particular idea of his own cat. But the whiteness is out of harmony with his idea. Probably, accompanying his *idea* there is an *image* of his black cat. If the two cats appear together in the flesh, the contrast in colour is brought home still more clearly. His attention is directed for a moment almost exclusively to the differing colours. Whereas the blackness of his cat was previously bound up with the whole complex of qualities, it now stands out prominently, as also does the whiteness of this strange cat. Either now or at some future time, in connection with this or similar experiences, he hears the words *black* and *white*, and he learns to produce them himself, and to image them.

The definite hold which he has over these words (for he can produce or image them at will) enables him to fix his attention more definitely on the discriminated qualities corresponding to them. Although such qualities never

occur except in connection with many other impressions, he is able to direct his attention almost exclusively to them by the help of the words. He has obtained two *abstract ideas*, and he has done this as the result of the *comparison* of two things which are alike in most respects, but which differ in one at least.

But these qualities, *white* and *black*, having once been singled out by attention, will now be noticed in other complexes. Paper, snow, clouds, the table-cloth, the ceiling, and the sheets of the bed are also white. The child will notice this quality in many such objects of his environment. The repetition of the word *white* by those around him will greatly assist this concentration of his attention, and, as he imitates the word himself, he will gain still firmer control of this new idea. Similarly with *black*. Coal, ink, the fire-grate, boots, and many other objects which he sees are black, and he hears them so called by the persons surrounding him. In this way he *generalises* each abstract idea, *i.e.* he sees that it is an element in a number of things differing in other respects. He has formed ideas of *white and black things*. He has not merely an *abstract* idea in the case of each quality, but a *general* idea, *i.e.* an idea of a class of things possessing the quality.

It should be noted that the processes of *abstraction* and *generalisation* are inextricably intermingled. The *abstract* and the *general* are not two separate ideas: they are so intimately connected that they may be considered as obverse and reverse of one and the same idea.

The formation of abstract and general ideas does not usually take place in the "cut-and-dried" fashion which a definite outline of it might lead one to suppose. In one case on record, however,—that of the wild boy of Aveyron—what usually goes on in more or less haphazard fashion, aided by the stimulus of older persons and the words they use, though not methodically directed by them, had to be definitely caused by carefully arranged procedure. M. Itard has left us a detailed description of the way in which he aroused abstract and general ideas in the mind of a boy who could neither talk nor understand spoken language. He writes as follows:—

"I was entering now into the field of abstractions, and I entered into it with the fear that I should not be able to penetrate into it, or that I should soon find myself stopped by insurmountable difficulties. There were none at all; and my first demonstration was seized at once, although it dealt with one of the most abstract qualities of bodies—that of extension. I took two books bound alike but with pages of different size: one was an 8vo, the other an 18mo. I touched the first. Victor opened his note-book [in which he had the words he knew], and pointed with his finger to the word *book*.[1] I touched the second, the pupil indicated again the same word. I repeated the operation several times, and always with the same result.

"I then took the smaller book, and, holding it to Victor, I made him spread his hand flat on the cover. The latter was almost completely covered. I induced him next to do the same thing on the 8vo book; his hand scarcely covered a half of it. In order that he could make no mistake with respect to my intention, I called his attention to the part which remained uncovered, and tried to get him to stretch out his fingers towards that part. This he could not do without uncovering a portion equal to that which he succeeded in covering. After this experience, which demonstrated to my pupil in such palpable fashion the difference in extension of these two objects, I asked again for their names. Victor hesitated; he felt that the same word could no longer be applied without distinction to two things which he had just found unequal. It was just to get him to this point that I was waiting. I now wrote the word *book* on two cards, and placed one of them on each book. I then wrote on a third card the word *large*, and the word *small* on a fourth. I placed these by the side of the first cards, one on the 8vo and the other on the 18mo book. After having caused Victor to notice this arrangement, I took up the tickets again, mixed them up for some time, and then gave them to him to be replaced. They were put back properly.

[1] The word is *livre* in the original. But it has been thought best to translate everything.

"Had I been understood? Had the respective meanings of the words *large* and *small* been grasped? In order to have both the certainty and the proof of it, I proceeded in the following way. I sent for two nails of unequal length. I had them compared [by Victor] in almost the same way as in the case of the books. Then, having written on two cards the word *nail*, I gave them to him without adding to them the two adjectives *large* and *small*, hoping that, if my preceding lesson had been thoroughly grasped, he would apply to the nails the same signs of relative size which had served him in establishing the difference in dimension of the two books. He did it with a promptitude which made the proof all the more conclusive. Such was the procedure by which I gave him the idea of the qualities of extension. I employed it with the same success to make intelligible the signs which represent the other sensible qualities of bodies, such as those of colour, of weight, of hardness, etc." [1]

Reverting to our normal child whom we have supposed to be dealing with cats instead of books, and who has just acquired by means of a similar process of comparison the ideas of *black* and *white*, we may ask— What, meanwhile, has happened to his original particular idea of his own cat? It can still be awakened as before. But it is richer. When it arises it tends to bring with it the traces of his comparison. He can now say, or at any rate think, *My cat is black.* He has *two* ideas—one of the whole concrete cat, and one of the colour; and he recognises that the colour is part of, *i.e.* a quality of, the whole cat.

He has, then, gone through processes of *analysis* (singling out the colour) and *synthesis* (connecting the colour with the whole). And he can also say in reference to the other cat, *That cat is white.* Further, his particular idea of his own cat has been modified (the colour being neglected) so that it will apply to the strange cat. He may not be clear yet as to all the other qualities possessed by both cats, but he is aware of the general likeness of the

[1] Itard, *op. cit.*, pp. 86, 87.

new cat to his own cat. Indeed it is because this likeness is so great that the particular idea of his own cat has been aroused in connection with this new case. This, however, involves a new idea. The original particular idea of his own cat is still capable of arising and of referring only to that cat. But it has given birth to a new idea referring to the two cats. Later, he will perceive cats of other colours, and of different sizes. The process of comparison will take place again, and he may obtain abstract ideas of other qualities in the same way as he gained those of *white* and *black*. His new idea referring to the two cats will be aroused again and will be further modified to cover these additional cases.

Gradually, then, while still retaining the particular idea of his own cat, he will develop an idea applicable to an indefinite number of cats. This is a *generic idea*. We cannot yet call it an *abstract idea*, for there is at present no definite consciousness of the properties which are essential. There certainly is some awareness, however hazy, of the general characteristics of a cat; otherwise the child would not be able to recognise a new cat when it presents itself, nor could he refuse to give the name to a dog. But if the child, at this stage, were asked what a cat is, he could only reply by pointing to one; he could not describe or define one.

A large number of the child's ideas of classes of things remain for a long time in this state; not a few continue so throughout life There is sufficient acquaintance with the essential make-up of each of the classes of things, but no thorough analysis has been made. The child can readily use his generic idea in recognising and naming objects of the class; but he cannot specify exactly what the idea includes and excludes. Under such circumstances it is useless to ask him for a definition. As a general rule, it is better to require him to say or do something which demonstrates his grasp of the meaning of the word, than to ask him to define it. Suppose the word in question is *plant*. The teacher may ask the little one to mention some plants, to bring him a plant, to draw one, or to say something about plants. If the child responds intel-

ligently to such requirements, it is obvious that he possesses a fairly satisfactory generic idea.

As we have already seen, a complex of qualities occurring again and again will not be broken up into its elements unless each of those qualities can be apprehended separately in other parts of experience. The child, therefore, will not be able to enumerate all the essential properties of a cat until he has had further experience in which each of those properties can be singled out by comparisons similar to those described in the case of *black* and *white*. Such comparisons are continually occurring in all parts of his perceptual experience, *i.e.* in connection with many of the objects with which he comes to deal. After much comparison of this kind, aided by language, the child is at length in possession of a large stock of abstract ideas, and may, if he returns to a more careful observation of cats, at last arrive at a very exact knowledge of the distinguishing features of the feline race.

And what he can now do in the case of cats, he can do also for many other classes of things. He has a large number of labels from which selections can be made to describe or define any objects which he chooses to examine carefully. And in the process of such examination, he not only gains more command over the labels which he already possesses, but he acquires many new ones on account of further comparisons which he is led to make. It is for this reason that systematic lessons in observation are so valuable.

We see, then, how the vague ideas of classes of things which we have called *generic* are gradually developed by analysis and synthesis until they become explicitly *general* and *abstract*. Such refinement reaches its consummation in the *definition*, which clearly states, and thus helps to fix in the mind, the net result of the abstractions. This is a great help wherever the exact thought of science is required. But it is necessary only in such cases. In other spheres we can get along with far less distinctness of meaning. Indeed, if the bulk of our mental energy were consumed in fixing definitely the meaning of *every* term we employ, we should often fail to appreciate the

total effect of the ideational constructions which we frame. In order to enjoy the view of a chain of mountains, it is not necessary to count the peaks or measure their height. In order to appreciate a beautiful poem, it is not necessary to define exactly the meaning of all the words.

Many individuals, indeed, fail to recognise the beautiful because of their tendency to over-analysis. And teachers would do well to remember this fact when dealing with literature in school. Of course, some amount of meaning is necessary. Otherwise the thing could not be appreciated at all. But the search for meaning must not kill the interest in the whole, as so often happens. As Professor Welton suggests, "with younger boys and girls the passages of literature intended to rouse an emotional interest should be simple in idea and expression, so as to require no extended activity of the intellectual interest. For this is likely to remain attached to the poem and to be fatal to any real emotional effect. A silent reading to get the drift of the passage; a question or two to make sure that it has been grasped; then an impressive reading by the teacher is the most probable road to success." [1]

A large number of our ideas, therefore, are allowed to remain, and quite rightly, in the generic or, at least, the vaguely abstract stage. We know quite well enough for our purposes what we mean, though we cannot state explicitly all the properties which are essential to the constitution of the classes of things to which we are referring.

It is now obvious that the process of ideation in its early stages is nothing other than *observation*. These early processes of ideation spring out of the child's perceptions, being accelerated by the use of words on the part of the people around him, by his imitation of those words, by his use of them in new connections, and by the consequent fixing of their meanings.

There has been considerable discussion among philosophers and psychologists as to whether we can think

[1] *The Psychology of Education*, pp. 243, 244.

without words. We have already referred to the concept as the thought which is aroused by a word. This is good enough for practical purposes. For in the immense majority of cases the two occur together. We think by means of, and by the aid of, words. It is not necessary, of course, to utter them, though when people are thinking forcibly they often do. The faintest image of a word, whether visual, auditory, or kinæsthetic, or a combination of some of these, is sufficient. So faint, indeed, are these images, and so close is our attention on the meanings, and on any other images which may arise, that we ordinarily fail to notice the "inner speech," the verbal accompaniment to our thoughts.

It might, however, be well to extend our definition by saying that the concept is the thought aroused by a word *or the equivalent of a word.* For in some cases other signs are used instead of words. To the mathematician $(a + b)^2 = a^2 + 2ab + b^2$ expresses thoughts about quantity which could be expressed in words, but which are more readily expressed by the signs in question. A nod of the head, a smile, or a wink, may often mean to us quite as much as a word (though often we subconsciously translate them into words). It is also possible to use the images of the things themselves instead of words. Thus the chess-player thinks of the consequences of a certain move, not necessarily in words, but in terms of images; he "sees" the board with its chessmen as it would be if certain moves were made. In perception, too, we often identify objects without naming them. Here the percept itself takes the place of the word. With these comparatively few exceptions, however, thought and language develop together.

As we have already hinted, the language employed need not be the spoken form which is commonly utilised. Thus Laura Bridgman and Helen Keller, two of the most distinguished of blind-deaf mutes, have made remarkable progress in thought without any assistance from ordinary speech. It is instructive to read what Archbishop Whately wrote more than fifty years ago on the subject of Laura Bridgman.

"There have been," he wrote, "some very interesting accounts published, by travellers in America, and by persons residing there, of a girl named Laura Bridgman, who has been, from birth, not only Deaf-and-Dumb, but also Blind. She has, however, been taught the finger-language, and even to read what is printed in raised characters, and also to write.

"The remarkable circumstance in reference to the present subject is that, when she is alone, her *fingers are generally observed to be moving*, though the signs are so slight and imperfect that others cannot make out what she is thinking of. But if they inquire of her, she will tell them.

"It seems that, having once learnt the use of *Signs*, she finds the necessity of them as an *Instrument of Thought*, when thinking of anything beyond mere individual objects of sense.

"And doubtless everyone else does the same; though in *our* case no one can (as in the case of Laura Bridgman) *see* the operation; nor, in general, can it be *heard*; though some few persons have a habit of occasionally audibly talking to themselves, or, as it is called, 'thinking aloud.' But the signs we commonly use in silent reflection are merely mental *images*, usually of uttered words: and these doubtless are such as could be hardly at all understood by another, even if uttered audibly. For we usually think in a kind of *shorthand* (if one may use the expression), like the notes one sometimes takes down on paper to help the memory, which consist of a word or two—or even a letter—to suggest a whole sentence; so that such notes would be unintelligible to anyone else.

"It has been observed also that this girl, when asleep, and doubtless dreaming, has her fingers frequently in motion; being in fact talking in her sleep." [1]

The spoken form of language is certainly the most convenient, especially where rapid and easy communication with others is desired. Hand-signs and gestures, however, can be used, and often are. But with the spoken form,

[1] Whately, *Elements of Logic*, Ninth Edition, p. 13 (footnote). One word has been changed to bring Whately's language into harmony with current practice.

men can go on talking even when their hands and other portions of their bodies are employed with work. It is considered by some that this fact is most important. Primitive men would probably have remained much longer on lower levels of thought if they had not discovered the utility of oral speech. For with their hands employed so constantly in ministering to their needs, they would have had little opportunity for communication one with another. And it is necessary to bear in mind that it is in communication one with another that speech and thought develop. We tend to forget this fact in these days, when we have a rich vocabulary ready-made, and when it appears possible for solitary thinkers to go on communing with themselves for lengthy periods. But even here careful analysis will reveal the social stimulus. Even the recluse is largely stimulated by the impulse to communicate with others. Although he will scarcely admit it to himself, he is constantly imagining a community of souls with whom he can converse. And if he puts pen to paper, he is dimly conscious that someone—perhaps after his death—will read what he writes.

It is perhaps partly on account of an additional stimulus to communicate with others that mentally defective children have been found to improve in speech during a course of handwork. The things placed in their hands are a direct stimulus to do something with them. But they can only achieve what they desire by listening to the directions of their teacher, and by asking for certain things which they require.

There is no doubt that the teachers of the past generation have failed to appreciate the importance of stimulating the children to express themselves in good language. They have often been satisfied with mere listening on the part of the children, followed by the answering of a few questions. But the answering of a question usually necessitates only a few words—sometimes only one. As a consequence many children have grown up without ever having been required to give *a connected account* of anything. In these days, however, the importance of getting children to talk at length on what they have seen or heard or done, is

gradually becoming recognised; and after many modern school lessons, we find several children called out to recount in full what they can remember of the matter which has been dealt with.

Some psychologists believe that thought can occur not only without images of the things specified, but without words or any other mental support. Some people whose powers of introspection can be relied upon declare that they often have thoughts, or directions of attention to certain things, without any other mental accompaniment. "It may possibly be (I say this hesitatingly) that their apprehension of meaning is purely physiological—done by a not-felt attitude; at least, we have found cases of *recognition* in which neither felt-attitude nor verbal fringe could be discovered by introspection, so that for all we could tell the act of recognition was a purely physiological reflex matter: the organism fell into the recognitive attitude without any introspectively discoverable change in consciousness."[1]

This may be so. But it does not diminish the necessity of percepts, images and words in the early stages. In other words, this imageless thought can only arise after a great deal of conception has taken place with the usual mental supports. Thus Professor Huey says: "Doubtless it is a development from the other; and doubtless there are all stages between the extremes."[2] The thought centres, when once awakened and developed through processes of perception and imagination, may finally be able to function alone. But even if such cases of "pure" thought do occur, it still remains true that under normal circumstances thought is greatly helped and clarified by speech Everyone has surely had the experience of a thought, or series of thoughts, which were anything but clear and precise until expressed in words. Most teachers have frequently been mortified to discover the incompleteness and vagueness of their own ideas when they have had to state them to their pupils. And some 'cute individuals, desirous of

[1] Huey, *The Psychology and Pedagogy of Reading*, p. 183.
[2] *Ibid.*, pp. 183, 184.

obtaining a good grip of a subject, will arrange to give lectures or lessons upon it to others, knowing, as they do, that it is only when a man has expressed himself at length that he really grasps the matter thoroughly.

Those nations which have reached a high stage of ideation, which have thought of a large number of things, are found to possess a large vocabulary, as evidenced by the size of the dictionaries of their languages. A person who uses language freely and well is one who has a free flow of thoughts. His language, indeed, as expressed either in speeches or books, is the chief, often the only, means whereby we become acquainted with his thoughts.

There are, of course, some reservations to be made. A man may hesitate and speak slowly, not because his thoughts are slow and infrequent, but because they are so numerous and rapid that they struggle with one another for expression. For though we may have several thoughts, we have only one vocal apparatus.

On the other hand, a man may speak rapidly, but much of his language may be of the "parrot" variety, a species of vocal glibness without the corresponding ideation. "Discourses at prayer-meetings, re-shuffling the same collection of cant phrases, and the whole genus of penny-a-line-isms and newspaper-reporters' flourishes give illustrations of this. 'The birds filled the tree-tops with their morning song, making the air moist, cool, and pleasant,' is a sentence I remember reading once in a report of some athletic exercises in Jerome Park. It was probably written unconsciously by the hurried reporter, and read uncritically by many readers."[1] If, however, a man is thoroughly tested by being asked all sorts of questions, and if he is able to reply suitably to every one, we come to the conclusion that his thoughts are clear and adequate. This, of course, is the kind of test which is made in examinations, both oral and written. And 'cute examiners avoid setting questions which may be answered straight from a book, in order to ensure that the candidates are not merely repeating words without any definite meaning.

[1] James, *Principles of Psychology*, Vol. I., p. 263.

Questions on Chapter VII.

1. Distinguish clearly between an *image* and an *idea*.

2. A dog and a child are born on the same day, and live largely in the same environment. Which is the more intelligent—

(*a*) at the end of three months,

(*b*) at the end of six years?

How do you explain the differences?

3. How would you satisfy yourself that a boy who can repeat many of the statements in his text-book really understands them?

4. Why is it not advisable to ask very young children for definitions of the words they use? How could you be sure, without asking for definitions, that the children understand those words?

5. What is an *abstract idea*? Show by an example that its arousal depends in the first instance on *comparison*.

6. Briefly enumerate all the facts which go to show that thought and language are intimately connected.

7. Many young teachers fall into the error of doing too much of the talking themselves. Explain the nature of this error.

CHAPTER VIII.

IDEATION (II.).

IT has already been shown how important words are in fixing and preserving abstract ideas. In some cases, indeed, they take the lead from the beginning. The process of abstraction would never occur at all in many cases except by the aid of some word or its equivalent. Perhaps the help of words is nowhere more obvious than in the sphere of number. Here the continual use of the words *one, two, three, four* . . . in connection with all kinds of concrete objects gradually enables the idea of number to be abstracted from its concrete embodiment. The child learns to say, *one, two, three, four* . . . at first by imitation, and often without any attention to objects being counted. He continues to do it, still by imitation, in dealing with things of the same kind, as in walking up steps, handling marbles, or balls, or beads, one after another. Gradually he feels the appositeness of the names when dealing with things of the same kind. Yet for a long time he has no distinct idea of number as distinguished from the things. But after a large amount of experience of this kind, he no longer pays attention to the nature of the things to be counted. He attends to the numbers denoted by each of the words *one, two, three, four* . . . He has obtained *abstract ideas* of the numbers.

The essential process in abstraction, here as elsewhere, is comparison. There is the same noticing of differences which we have already studied. The child contrasts one, two, three and four marbles. And he seizes upon the terms *one, two, three, four* to mark the differences which he notices. But if he always counted *marbles*, he would not attain the purely abstract ideas of number which all

normal children acquire so soon. He performs similar operations, however, with many different units. And in this way he comes to disentangle the numbers from the concrete embodiment in which they always occur in the real world.

This involves a new variety of comparison—a seeing of *likeness* amid difference. Instead of noticing a *difference* between things which are in other respects *alike*, he notices *likeness* between sets of things (three marbles, three balls, three beads; five marbles, five balls, five beads; and so on) in other respects *unlike*. His method is one of *isolation by varying concomitants*. And this isolation is possible largely because a series of words (*one, two, three, four* . . .), being the same in spite of great differences between the concrete things, calls attention to a common aspect of those sets of things.

There are, thus, two fundamental modes of comparison on which ideation depends. They may be called the *method of difference* and the *method of agreement* respectively. They both depend upon the fact that things are partially alike, partially unlike. In the former case we note the quality because it stands out as a difference between things which are in other respects alike. In the latter case our attention is drawn to the quality because it is a common element in things which are in other respects very different: it "rolls out" in the mind on account of its continued presentation amid varying concomitants.

A large number of our higher abstract ideas, *i.e.* those which do not depend on some obvious quality which is likely to be readily noticed by the method of difference, are greatly helped in their formation by the fact that a given word is used in each particular case, thus inviting our attention to the point or points of likeness. Thus, such ideas as those of *courage, wisdom, temperance,* owe much of their existence as definite ideas to the fact that the use of the same word in a number of differing cases disentangles a common element. At the same time, it must be admitted that they also owe something to the marked differences noted between the actions of men who are alike in many other respects; between, for instance,

the valiant man and the coward, the drunkard and the sober man. We see, then, that both methods co-operate in the formation of our abstract ideas.

The teacher, therefore, in striving to cause his pupils to acquire a given idea, must make use of both processes. Thus, in getting his boys to form a clear notion of *porous* substances, he might get them to compare such things as clay and pumice-stone, or marble and sugar, with respect to their power of drawing up water into themselves. (The essential nature of the difference might be made clear by taking a coloured liquid and lowering into it two glass tubes, one of ordinary calibre, the other a capillary tube. In the latter case the liquid will rise.) When the boys have noted the difference in question, the teacher might lead them to examine a number of other substances (blotting-paper, cane, lamp-wick, sponge, ordinary soil) which, though very different in many ways, all possess the quality of porosity.

Most of the cases which we have examined up to the present are instances of the formation of abstract ideas directly from the concrete of actual experience. And the maxim, *Proceed from the concrete to the abstract*, has been clearly exemplified. But there are abstractions on various levels. What is abstract when compared with the concrete on which it is based may be "concrete" when compared with a higher abstraction of which it forms one of the foundations. Thus, *white, black, red*, etc., are abstractions from the concrete of perception. But *colour* is a still higher abstraction, with respect to which *white, black*, and *red* are relatively "concrete."[1] And *colour*, when compared with other coordinate abstractions such as *weight, size, form*, etc., can give rise to a yet higher abstraction—*quality*. If, then, we are to move freely in the world of abstract thought, we must be able to leave, for a time, the concrete world of perception which is our necessary starting point. For if we always stick close to that, we

[1] It is important for the student to grasp this wider meaning of the term "concrete." Further reference to it will be made in the next chapter.

shall find it difficult to rise beyond abstract ideas of the first grade.

It may be well to turn aside here for a moment to emphasise the significance of these last remarks for teaching. Let us revert to the sphere of number. Many teachers are so much impressed with the necessity of counting concrete things in the early stages that they are inclined to go on dealing with actual things long after the time when the child has a clear notion of number in the abstract. This only hinders progress. For the concrete prevents the child from making further progress in the abstract sphere.

When, for instance, the child has learned (by the help of the concrete) to do addition sums, and has learnt his multiplication table (also by the help of the concrete), he is able to understand multiplication sums as quick ways of doing addition without any further reference to the concrete. If I bring him back to the concrete, I shall only confuse him with the variety and complexity of that concrete. He works a number of sums such as $36 + 36 + 36 + 36$, $25 + 25 + 25 + 25$, $47 + 47 + 47 + 47$. He can do these without any reference to the concrete, and he will see that if he knows by his table the sum of $6 + 6 + 6 + 6$ ($4 \times 6 = 24$) and of $3 + 3 + 3 + 3$ ($4 \times 3 = 12$) and of $5 + 5 + 5 + 5$ ($4 \times 5 = 20$) there is no need to work out the result each time. He can still put his sums down in four lines, though he saves himself the trouble of adding each number separately. Later he will appreciate the "fag" of writing down the same number four times, and will be only too ready to accept the suggestion to put it down once with a 4 underneath to indicate that it is to be repeated four times. He has acquired the more abstract idea of multiplication; and he has done it on the basis of the abstract knowledge of number which he already possesses. The "concrete" from which he starts is the addition sum with which he is already familiar.[1] A reference *at this stage* to the concrete

[1] "The old maxim, 'Proceed from the concrete to the abstract,' still holds, but the term 'concrete' has assumed a new significance." —Bagley, *Educational Values*, p. 49.

on which his ideas of number are based, and which has made it possible for him to do addition, would only confuse matters.

It must not be concluded that the whole business of the teacher consists in getting the child away from the concrete in order that he may roam for ever in the region of the abstract. The educational maxim, *Proceed from the concrete to the abstract*, has led to much confusion in the minds of teachers. Some have been so impressed with the words, *Proceed from the concrete*, that they have been content to remain in the concrete as long as possible —long after ascents to the higher regions of the abstract have been rendered possible. They have, in short, neglected the implication of the word *Proceed*.

Others have gone to the opposite extreme. They seem to have taken the word *Proceed* as meaning *Get completely away from*. And they have taken the abstract as their *final* goal. But it is not so. The abstract, after all, is an artificial product. The world in which the child is to live and work is a concrete one. We do not make abstractions —unless we are mere philosophers—except in order *to deal more effectively with the corresponding concrete*.

So in arithmetic. The child will not gain great facility in calculation unless he can take his first, and rudimentary, abstract ideas as a "concrete" for still higher abstractions. But when he has these, he should apply them to new concrete cases. And they should be *real* concrete cases. Too many of our school sums are not real; they deal with supposititious cases which are never likely to occur in actual life—least of all in the lives of the pupils. The teacher should be ever on the alert to ignore such sums, even though they occur in printed books. He should try to frame problems and exercises dealing with the life which is known to the pupils and in which they may consequently be expected to take some interest.

Abstract ideas of *relations* between things are usually more tardy in arising than abstract ideas of qualities. The child is, of course, aware of some of these relations in connection with his other ideas. But it is difficult for him to single them out for separate attention. Thus, the

child may distinguish very clearly between two apples one of which is bigger than the other. He may even choose one because of its size. But the abstract ideas he forms are rather that of *bigness* as attaching to the one apple and of *littleness* attaching to the other. It is quite true that these attributes are both only aspects of the relation existing between the two apples. (The smaller might be considered *big* if it were placed with a tiny apple, while the larger would be called *little* if placed beside a gigantic one.)

In the case of the qualities of objects, there is usually something quite definite in the percept or image on which we can fix our attention. Thus the whiteness of an object is something very clear to me when my attention has once been called to it. But relations are more subtle. They are only experienced perceptually in passing from one thing to another. And the passage must be rapid; otherwise the peculiar feeling attaching to it is not felt.

Relations are not therefore parts of our percepts on which we can *dwell*. They are *transitive* states. "Now it is very difficult, introspectively, to see the transitive parts for what they really are. If they are but flights to a conclusion, stopping them to look at them before the conclusion is reached is really annihilating them. Whilst if we wait till the conclusion *be* reached, it so exceeds them in vigour and stability that it quite eclipses and swallows them up in its glare. . . . The attempt at introspective analysis in these cases is in fact like seizing a spinning top to catch its motion, or trying to turn up the gas quickly enough to see how the darkness looks."[1]

It is not surprising, therefore, that some of us do not form clear and distinct ideas of many of these relations The fact that in a large number of cases it is hard to find *separate* words for these relations indicates both that the human race in general has not formed very clear ideas of them, and also that it will be hard for any child to do so (since a definite word is a great help in fixing attention in a given direction). The child learns to say "This apple

[1] James, *Principles of Psychology*, Vol. I., pp. 243, 244

is bigger than that one," "My father *is bigger than* my mother," "The dog *is bigger than* the cat," and the meaning of the word *bigger* becomes gradually clearer. But it is probably never so clearly separated in thought from the context in which it occurs as *white* or *black* or any other similar abstract idea can be. The very form *bigger* demands some words at each end before one thinks of a definite meaning; while such a word as *white* or *black*, though of course equally artificial in reality when used alone, calls up a definite meaning even without a context. This difficulty in the way of complete abstraction is not surprising when it is remembered that a relation only holds between two or more terms, and that it ceases to exist if the terms disappear.

It should be borne in mind that abstract ideas of relations need not be any more definite than is sufficient for us to use them properly. And further, that they often require a good deal of experience in the concrete before they can be singled out in thought. Teachers are liable to forget this in their anxiety to push on with their instruction. Thus most teachers, and most books on arithmetic, begin to deal with *ratio* and *proportion* by a formal lesson in which the attempt is made to get the pupils to frame clear abstract ideas corresponding to these terms.

A few examples are given, such as 1 . 3 :: 5 : 15, 7 : 12 :: 21 : 36 and the scholars are pressed, after a brief examination of the relations involved, to form clear notions of *ratio* and *proportion*. Would it not be better to lead the children to feel the relations in working *a large number of examples*, and reserve the names until the learners are tolerably familiar with the relations? Thus, suppose such sums are given as the following: If 7 carpenters work for a week and are paid £12, how much ought 21 carpenters to receive for working the same time? Sharp pupils will find the answer for themselves, and will be able to tell the method they followed. They divided 21 by 7, and then multiplied £12 by their quotient.

Skilful questioning will lead them to see why they did this. They realised that there were more men (21) on the

second occasion, and that they should be paid more. How many times more? Just as many times more as the times the number of men were more. How can this be found? By dividing the second number of men by the first number ($\frac{21}{7}$). And why do we multiply the £12 by the result of this (3)? Because we know that the amount to be paid must also be 3 times the first amount. Knowing now our answer, we see that $\frac{21}{7} = \frac{36}{12}$. But at the beginning of the sum we did not know 36. Represent it by x. Then—

$$\frac{21}{7} = \frac{x}{12}.$$

This means that x is as many times 12 as 21 is times 7. By dividing we found that 21 was 3 times 7. Hence x is 3 times 12. Doing both operations together, we have

$$\tfrac{21}{7} \times 12, \text{ or } \frac{21 \times 12}{7}.$$

After working several sums in this way and after becoming familiar with the operations, scholars can be given the word *ratio*. In fact the term can be used to simplify the wording. Thus instead of saying, 21 is as many times 7 as 36 is times 12, I may say: The *ratio* of 21 to 7 = the *ratio* of 36 to 12.

We see, then, that the child not only goes on acquiring more and more particular ideas, but that his further perceptual experiences lead to the formation of a large number of abstract ideas, both of qualities and of relations, and also of a number of generic ideas of classes of objects (as *cats, dogs, horses*). These various processes of ideation go on in intimate connection. The abstract ideas, for instance, are used in analysis of the objects referred to by the particular and generic ideas. Thus the child is able to say, *My cat is black, My cat has four legs, My cat has two eyes, My cat is bigger than the white cat next door.*

In the same way the objects referred to by his generic ideas can be analysed by the use of his abstract ideas. Thus he can say, if occasion requires it, *All cats have four*

legs, All cats have two eyes, All cats are bigger than mice, but smaller than horses.

Such statements, whether referring to individual things or to classes of things, are called *judgments*. It is evident that the child is making them from the time that he begins to frame his first abstract ideas. Indeed, concepts and judgments are only different aspects of the same process. The forming of a concept itself involves judgment, whether expressed or understood; and, conversely, judgment always involves the use of some previously formed ideas. Thus if a child obtained his abstract ideas of *black* and *white* in the way we have described (see p. 116), he would be making, though vaguely, such judgments as *That is a cat, My cat is black, That cat is white.* These judgments might not, of course, be uttered, but they would be more or less clearly understood.

Not only is the process of conception itself a judgment, but it renders further judgments possible, and in these judgments the concepts are being made richer and more definite. By means of these further judgments the child can analyse in thought both particular objects and the objects which are thought of in his generic ideas. Thus, supposing he has a sufficient number of abstract ideas; he is able to enumerate all the qualities of any individual thing with which he is acquainted. He separates out all those qualities which, though not discriminated in his original particular idea, went to form that vague whole idea. This series of judgments would be called a *description* of the object.

Children are continually being asked to do this in the early stages of their education, not merely because it fixes in their minds a certain amount of information, but because the process of doing such things renders their ideas richer and more definite, fosters the habit of observing carefully, and thus leads them to enrich their stock of ideas. The lessons in which this kind of thing is done are usually called *observation, object,* or *nature-study lessons.* And in view of what has been said, it is obvious that there is little profit to be obtained by the teacher's doing the talking, except where a few words are

necessary to direct the observations of the children. The children must observe for themselves, and themselves describe what they have seen.

"We may say, then, that the two processes marked off by logicians as Conception and Judgment are not essentially different. . . . We only reach a general notion at all by means of a comparative detection of likeness, which, when explicit, is judgment. Conversely, since our ordinary judgments involve general notions, we may say that it is only after carrying out some measure of conception that we are prepared for the higher and more elaborate type of judgment."[1] When we are thinking of *results*, we tend to use the word *concepts*; when we are thinking of the *acts* of cognition whereby and wherein those results arise, or are applied to new cases, we tend to use the word *judgments*.

As we have already intimated, judgments are made not only on particular objects, but about classes of things. The early judgments of children are mostly made on particular things. But as particular ideas are continually being extended to cover classes of things, there is a tendency for the child who has formed a judgment with respect to an individual thing to make the same judgment extend to the class. This goes on in spite of the fact that sometimes the very beginning of the extension of the name (e.g. *cat*) to other objects beyond the first one noticed arises in connection with the formation of abstract ideas of contrary qualities (e.g. *black* and *white*), one of which is possessed by the first, the other by the second. There is no distinction in the child's mind—except where he has definitely observed a difference—between the individual member with which he begins his experience of the class and the other members. Consequently all that he learns of the individual is transferred to the other members. He is, therefore, said to have a tendency to hasty generalisation.

But this is a universal tendency. For as we have seen, the generic idea of the class is formed by extending the particular idea to new cases. And unless some

[1] Sully, *Outlines of Psychology*, New Edition, p. 272.

characteristic in the percept of a new case is in opposition to the idea, there is no reason why the extended particular idea should be modified. Gradually, however, after repeated hitches, one becomes wary. The scientist, after long experience, refuses to generalise unless he has sufficient grounds for doing so.

As the child's store of abstract ideas becomes richer, and as his attention becomes more and more occupied with classes of things, he is able in some cases to convert his vague *generic* ideas of classes into truly *abstract* and *general* ideas. By a series of judgments he separates out from the vague complex of qualities by which he has learned to recognise a member of the class those properties of which he already has abstract ideas. In this way he forms a compounded abstract idea or concept[1] of the class, *i.e.* a definite notion of all the qualities which are essential to constitute membership of that class.

He does this, however, only in cases where there is need. Thus, when he comes to study geometry, his generic idea of a square must be refined and corrected; he must have definite knowledge of essential qualities—four equal sides, and corners right angles. When he states this knowledge, he is said to give a *definition*. But in the case of many classes of things with which he has to deal in practical life, this careful enumeration of several qualities is not necessary. His ideas of such classes may remain entirely *generic*, or they may be partially refined on account of the abstraction of certain striking attributes. There are, indeed, many gradations between the two extremes, *i.e.* between the vague, unanalysed *generic* idea on the one hand, and the clear-cut *general* or *abstract* idea of a class on the other.

Things of a class have usually certain outstanding qualities which distinguish the class from other things. And since the child, like the man, has a practical interest

[1] Lloyd Morgan uses the word *concept* only for such compounded abstract ideas. A "concept," then, for him is a "recombination through constructive synthesis" of several abstracted ideas of qualities and relations to form the total idea of a class. (See his *Psychology for Teachers*, p. 123.)

in things, since the things are handled with some purpose in view, these qualities, and these alone, become of great importance. If they have not already acquired corresponding abstract ideas in the child's mind, they will do so in the process of comparing other things which do not possess them, and which are consequently of no use for the purpose in hand, with the class of things in question. And judgments will be framed by the child in which these important qualities are predicated of the class.

The quality selected for special attention will not always be the same. Thus, when a child likes to stroke the cat's fur, the quality of being smooth to the touch will be an important characteristic. When he is interested in the catching of mice, the cat's usefulness in the house will form the predicate of his judgment about cats. When he gets scratched by a cat with whom he has been rough, the ability of the cat to defend itself will be the most prominent characteristic. When he sees pictures of a cat, or when he is engaged in drawing a sketch of one, the cat's general form will strike him most. Now in making such judgments he does not separate his original generic idea of cats (as a number of creatures like his own cat) from the abstract ideas of the particular properties which arise prominently in his mind under certain conditions. Each judgment is condensed, as it were, into a general idea of a class of creatures *possessing a certain property*. In other words, as we have already intimated, the effect of each judgment is to enrich and render more definite the original generic idea, thus making it more abstract, and consequently more definite in character.

The child has, then, a sort of complex idea consisting of the generic idea (as we have described it) + a definite abstract idea of one or more qualities which are uppermost in his mind. And this double idea is an enriched concept of the cat. It consists of two parts—(1) a reference to all the things denoted by the name, and (2) an abstract idea of one or more prominent qualities possessed by the members of the class. The first part of the meaning is usually called the *denotation*, the second the *connotation*.

It should be borne in mind that even the original generic

idea is of a class of objects *of a certain kind*, though the kind is not clearly specified. Gradually, however, it becomes clearer, since definite judgments are made about the class of things in question. Every general term or class-name has therefore a double meaning. It refers to certain things as wholes, and it also refers to the qualities which distinguish them from other things. Whenever we use the term, however, one or other of these meanings is usually uppermost. We think chiefly either of the *denotation* or of the *connotation*, though the two are so closely connected that one meaning is ever on the point of calling up the other. In general the denotation is the more explicit when we are in the realm of particular ideas, and dealing principally with percepts or images. Thus, when I say "All the soldiers were posted along the streets," the word *soldiers* is understood principally in denotation. But when we are in the realm of general ideas, and not thinking chiefly of a particular occurrence, the connotation is in the ascendant. Thus, when I say "Soldiers are necessary for the well-being of a nation," I am thinking chiefly of certain properties which soldiers possess, *i.e.* of the *connotation* of the word.

When I am *describing* what I have seen or *imagining* what I should like to see, many of my words are understood chiefly in *denotation*. I am in the world of *description* or *imagination*. When I am concerned chiefly with the *connotation* of my terms, and with the relations which exist between them, I am in the world of *thought proper*. I am not concerned for the moment with any *particular* case, but with qualities and relations which are to be found in *every* case. I am concerned with *universal* truth, not with the truth of any particular moment. It is obvious that the former is more important than the latter. All science is the effort to extort general truths from the particular occurrences which we observe around us. The generic idea as we described it at the beginning is, then, only a sort of particular idea, though it refers to a group instead of to one thing. It is not until we come to turn our attention to qualities and relations, till our original generic idea is also an *abstract* idea, till we read our terms

in *connotation*, that we can be said to be *thinking* in the true sense of the word.

The concept, as we have already indicated, may vary in signification. That part which we have called the *generic* idea of a class of objects, without any definite reference to their qualities, remains fairly stable; but the particular property which is uppermost in the mind varies from time to time. In other words, the denotation remains more steady than the connotation. If the child were asked to state his definition of cats at a particular moment, and if he could render his meaning faithfully, it might be any one of the following, according to circumstances:—

(1) animals that *scratch*;

(2) animals that *catch mice*;

(3) animals that *play with him*;

(4) animals that *can be stroked*;

(5) animals that *mew*.

Even adults have varying ideas of the same kind of thing at different times. Thus, the quality uppermost in my mind when I think of *paper* will vary according to the purpose I have in view. When I want—

(1) to light a fire, it is something *which burns easily*;

(2) to write a letter, it is something *on which black marks can be made*;

(3) to make a parcel, it is something *which can be wrapped round things*;

(4) to cut a pattern, it is something *which can be cut easily into various shapes*;

(5) to pack some china, it is something *which is soft and yielding*.

Statements of our ideas of things, considered on their *connotative* side (*i.e.* with respect to the qualities which they possess), are, as we have already noted, called *definitions*. A *definition*, therefore, is a statement of the connotation of a term. It is the unfolding of the term's

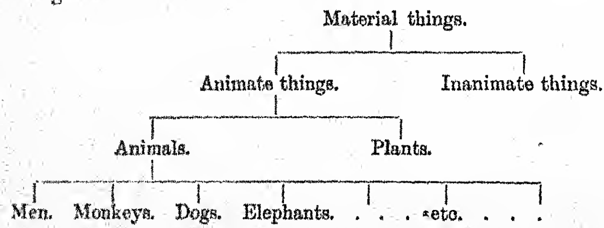
meaning in abstract ideas. When no such definite meaning exists in the mind, there may still be the other meaning—the *denotation*; in other words, one may have a *generic* idea of a class, the essential qualities of which have never been singled out, whether wholly or in part. In this case, the only way to show one's meaning would be to point to, or to indicate in some similar fashion, one or more of the objects referred to. Teachers would do well, as we have already suggested, to remember this alternative for definition, especially when dealing with young children. Where definition is impossible or out of place, this method of indicating our meaning may frequently be adopted.

Now many people will be inclined to ridicule some of the "definitions" of *cats* and *paper* which have just been considered. Teachers are only too prone to make fun of such statements. Yet they may be correct statements of the ideas in a person's mind at different times. And there is no doubt that the things are thus conceived in the most satisfactory way *for the purpose in hand.* As we have already noted, the only use of thought is to help us to proceed with the business we have in hand. Professor James has brought this out very clearly in the following extract.

"What is a *conception*? It is a *teleological instrument.* It is a partial aspect of a thing which *for our purpose* we regard as its essential aspect, as the representative of the entire thing. In comparison with this aspect, whatever other properties and qualities the thing may have are unimportant accidents which we may without blame ignore. But the essence, the ground of conception, varies with the end we have in view. A substance like oil has as many different essences as it has uses to different individuals. One man conceives it as combustible, another as a lubricator, another as a food; the chemist thinks of it as a hydrocarbon; the furniture-maker as a darkener of wood; the speculator as a commodity whose market-price to-day is this and to-morrow that. The soap-boiler, the physicist, the clothes-scourer severally ascribe to it other essences in relation to their needs."[1]

[1] "The Sentiment of Rationality," *Mind*, Vol. IV. (quoted in *Principles of Psychology*, Vol. II., p. 335).

The definition after which we as teachers always tend to hanker, the *logical* definition, which is supposed to be the true statement of the concept, expresses a thought which is seldom in anybody's mind except that of the logician or the scientist. It is the idea in the mind of a man whose purpose is to indicate the qualities which distinguish the class of things in question from all other things. It is well, however, to note how it is framed. One cannot hold a great many ideas in the mind at one moment. Yet the fact that we have had a large number in connection with a given object leads us, when the name of that object is mentioned, to feel that we could start making many judgments, each one predicating some quality of the class of things. Instead, however, of doing this, we *sum up*. It should be noticed that we can arrange the classes of things which we come to know in some order or hierarchy. Thus we can arrange material things as follows:—



The classification is only carried a little way—far enough to illustrate the matter in hand. It will be found that each class contains all the properties of the classes directly above it, together with some special properties which distinguish its members from those of the class or classes on the same level. Thus both animals and plants possess all the properties essential to animate things, and these possess all the properties essential to material things. Now if I wish to define the term *man*, it is sufficient to call him an *animal* (by which I connote all the properties possessed by animals), and then to assign some quality which distinguishes him from the other animals. Thus I

may select reason or rationality, which is not considered an attribute of any "lower" animal. I then define man as a rational animal. This kind of definition is said to be *per genus et differentiam*. The *genus* is the class next above (*animal* in this case) the essential properties of which are all possessed by this smaller class (which is called a *species* of the *genus*); and the *differentia*[1] is some quality which is possessed by all members of the class I am defining, but by none of the other co-ordinate classes.

It should be noted that all such classifications involve the hierarchy of abstractness to which reference was made earlier in this chapter (p. 131). Thus, for instance, the idea of *animate things* is a more abstract one than that of *animals*. The latter may thus be considered as "concrete" with respect to the higher class; but with respect to the lower classes subsumed under it (*men*, *monkeys*, *dogs*, *elephants*, etc.) it must be considered as abstract. As a rule a child gets fairly clear ideas (*generic* ones) of *men*, *monkeys*, *dogs*, *elephants*, etc., before he has a definite notion of the great class, *animals*, which includes all these. And, as a rule, he gets tolerably clear notions of *animals* and *plants* before he comes to think definitely of the greater class, *animate things*, which includes these two.

When, however, he has reached the level of thought which enables him to grasp the whole of such a classification, the higher or more abstract classes no longer present any difficulty. They are, indeed, more simple than the lower ones. For we must remember that he is now working with *general* or *abstract* ideas. And when he possesses all the abstract ideas necessary to define all the classes, he finds that he requires less of them to define the higher classes than the lower ones.

From the point of view of abstract thought, therefore, the lower we descend in the "concrete," the more complicated things become, and the higher we rise in the abstract, the more simple are our ideas. The *real* concrete at the bottom of such classifications constitutes a

[1] This is the Nominative Case of *differentiam* (which is the Accusative).

mass of material which our abstractions can never exhaust. But as we proceed upwards, we find classes which are more exclusively formed on the basis of pure abstractions. In this region, therefore, and *from the point of view of abstract thought*, we are more at home. Consequently when we have to define a class of things, *i.e.* to state its essential properties, we seize upon the class next above (*i.e.* the *genus*) which represents the results of our abstractions in this field. All that then remains to be done is to add to the *genus* the *difference* between the species we are considering and all other species of the same genus. We now have a definite abstract idea of the species in question. And we shall be able to use or assume this abstract result as it stands when we wish to define a still lower class to which the one just dealt with will stand as the *genus*.

The fact that we use a given *genus* in a definition therefore indicates, or should indicate, that we have already performed the work of abstraction necessary for marking off the qualities of that genus. Otherwise we should be using a word which we do not understand. The only remaining work, then, in defining our species is the finding of the *difference* between that species and the other co-ordinate species of the same genus. To do this we must come down to the "concrete" level of these species: we must compare examples of the species in question with examples of the other species belonging to the same genus.

When we say that the higher and more abstract classes are simpler and that the lower and more "concrete" ones are of greater complexity, it must be remembered that *this is only true from the point of view of the person who is employing abstract ideas, i.e.* who is looking at things from the abstract standpoint. But for the *young child*, who deals largely with *generic* ideas, the concrete is the simpler. For he takes it *as a whole*: he is not bothered about its complexity from the abstract standpoint. Now there is an educational maxim which runs: *Proceed from the simple to the complex.* What meaning are we to give to *simple* here? Shall we take it to mean that which is simple from the abstract standpoint? "Thus interpreted," this maxim

is in contradiction to the correlative one which tells us to begin with the concrete and go on to the abstract."[1]

The whole difficulty vanishes if we say: *Proceed from what is simple to the individual you are teaching.* For the young child with his *generic* ideas, the simple is the *concrete*, and the maxim in question will mean: *Proceed from the concrete to the abstract.* But when we are dealing with an older person who already possesses all the abstract ideas necessary to define a given thing, we may regard those separate abstract ideas as being simple for him; and in his case we may proceed *from the abstract to the concrete, i.e.* we lead him to understand fully a given concrete case by putting together a number of the simple abstract ideas which he possesses. The concrete with which he ends, however, is not the mere concrete, taken as a whole, with which the child begins: it is rather an *understanding* of the concrete. In other words, he understands the concrete in terms of abstract ideas.

These two views of the concrete—(1) as a mere whole, and (2) as a whole which is seen to consist of many parts or aspects—are continually claiming attention. From the first point of view a thing appears very simple; from the second it is seen to be very complex. Who has not begun the study of a subject thinking it was very simple and easy, only to find that the further he proceeded the more complex and difficult it appeared to grow? Perhaps no subject illustrates this change in point of view better than psychology. To the beginner sensations, percepts, images, ideas, feeling, volition, seem very simple things. He takes them *as wholes*. But when he comes to probe deeper into the subject, he finds that each of these wholes is a most complex process which seems to defy the utmost efforts of his analytical powers.

Examples can be found, also, in connection with other sciences. A young child may regard a frog as a very simple thing. But later in life, when he becomes a student of biology, he finds it more and more complex. He has acquired a large number of abstract ideas which have to

[1] Welton, *The Logical Bases of Education*, p. 263.

be arranged in very complex systems in order to allow him to understand something of the mysteries of that "simple" concrete frog. Very much the same explanation underlies the statement that the greatest scholars realise most fully the narrow limits of their knowledge. Socrates of old realised this. We are told by Aristotle that he was the first to make use of definitions. He went about probing the cock-sure persons who only possessed *generic* ideas of things, or at any rate very incomplete abstract ideas of them, trying to get them to see the imperfection of their understanding and the need of a deeper analysis. And he made many enemies in the course of his endeavours.

It is now obvious that a definition is of no value unless the person making it, or to whom it is given, has had full experience of all the things in question, so that he has made all the necessary abstractions, and now recognises the fitness of the definition. Children, therefore, should not be fed on definitions. They should only hear them when they have had a wide experience of the classes of things referred to, and of their qualities. We can be most certain of this when the children make their definitions for themselves. These definitions can, of course, be polished up by the teacher, when the language is clumsy. When children have thus worked out definitions for themselves, we can be quite sure that they have performed all the necessary abstractions, and consequently understand the definitions.

A definition, therefore, should not come at the beginning of a lesson. The children should be presented with many examples of the class of things to be dealt with, and should be led by careful observation of these things to single out the important and distinguishing qualities. This is the method usually described in the books on Teaching as the *Inductive Method*, or the method in which we *proceed from the concrete to the abstract.*

A teacher who is about to give a lesson involving a new concept or series of concepts would do well to begin his preparation by framing the definitions corresponding to these concepts. Not because he intends to *begin* with them, but because he should see clearly throughout his preparation the goal towards which he is working. Thus,

suppose his lesson is on *adverbial phrases and clauses.* He might write down such definitions as the following:—

(1) An *adverbial expression* is a number of words doing the work of an adverb.

(2) An *adverbial clause* is an adverbial expression containing a subject and predicate.

(3) An *adverbial phrase* is an adverbial expression not containing a subject and predicate.

Of course he would not give such a lesson until the pupils had already acquired some knowledge of grammar, *i.e.* until they had already formed some abstract ideas in this subject. His duty now is to take stock of these ideas. The boys must, for instance, already know what an *adverb* is and what is meant by the *subject* and *predicate* of a *sentence.* The introduction of the lesson will consist in a few questions on these ideas, both to assure the teacher that his boys know these preliminaries and to arouse them clearly in the boys' minds. The latter result is often referred to as the *preparation* of the boys' minds. By drawing attention to that which is relatively known, it prepares the way for a passage to what is relatively unknown.

If the teacher is proceeding on the inductive plan, he will not at first introduce his definitions, but will present examples of sentences containing the forms he is treating. He will construct these himself beforehand. And their arrangement will require considerable skill. He will note the several abstract ideas involved in the definitions. And he will remember that abstraction can only take place after *comparison* of two things or two classes of things which are alike in most respects but which differ in that one possesses, but the other does not possess, the quality to be abstracted. He may, for instance, have framed such sentences as the following:—

The boy ran *away.*	The boy ran *up the hill.* The boy ran *where the old man could not follow him.*

These sentences contain examples of an adverb and of adverbial expressions of *place*. Similar examples could be framed in which *time* and *manner* are indicated. In any case, additional and varying examples must be presented. For otherwise the boys would be liable to incorporate in their ideas of adverbial expressions peculiarities of wording or construction which do not matter. But with a number of examples the essential difference between an adverb and an adverbial expression will "roll out" clearly in the minds of the boys, freed from the peculiarities of any one example. To use the terms we have already employed, the *method of agreement* supplements the *method of difference*. By judicious questions the boys could be led to discover that the expressions *up the hill* and *where the old man could not follow him* do the work of an adverb. By further questions they can be led to compare these "compound" adverbs with the "simple" adverb with which they are familiar. They will thus notice the differing quality (several words instead of one). They will do the same with further examples. The teacher will give them the new word for the concept which they have framed as a result of their comparison (*adverbial expression*). He will now get them to repeat what they have already noted as the distinguishing feature. He may have to polish up their somewhat crude definitions. But he will have succeeded in getting them to frame the concept and to express it in words.

He next proceeds by further questioning to bring out the distinguishing features of the adverbial *clause* and the adverbial *phrase*. Here a comparison will be instituted, not between *adverbs* and *adverbial expressions*, but between the various pairs of the latter (such as the two given above). The boys find a subject (*the old man*) and a predicate (*could not follow him*) in one case. But they cannot find either subject or predicate in the other instance (*up the hill*). Further examples are examined; and as a result of their comparisons the boys are able to distinguish clearly between the various adverbial expressions. The teacher introduces the new terms (*clause* and *phrase*), and the boys should now be able to tell him what each means. Their

crude definitions will be polished up, if necessary, and they may be allowed to repeat or write the amended statements.

Lastly, the pupils will be required to pick out *adverbs, adverbial clauses* and *phrases* from a passage specially selected by the teacher on account of the many examples which it possesses. A further exercise would be to make boys themselves frame sentences containing the various forms. At first the teacher might give them a sentence containing an adverb, and require them to substitute a clause or a phrase. Later they could be required to frame examples of each entirely by themselves. Such applications of acquired knowledge to new cases are usually spoken of as *deductive* processes. We thus have *induction* followed by *deduction.*

Careful examination of this sketch of a lesson will reveal five steps:—

(1) *Preparation* of the boys' minds by questioning them on what they already know on the matter.

(2) *Presentation* of the selected examples.

(3) *Comparison* of the selected examples.

(4) *Generalisation*, the obtaining of the general or abstract ideas.

These steps were repeated twice—once to bring out the idea of an adverbial *expression,* and again to bring out the difference between a *clause* and a *phrase.*

(5) *Application,* the testing of the boys, with further fixing of the new ideas by using them in finding and framing other examples.

These five steps are practically the same as what are usually called the *Five Formal Steps of Herbart.* All lessons which involve the teaching of new abstract ideas should proceed on similar lines, and the notes might well be drawn up under the five headings we have specified. Lessons on grammar, science, and new principles in arithmetic lend themselves especially well to this treatment. Other subjects, such as geography, history, and literature, can also include lessons proceeding on similar lines. But to attempt to apply the Formal Steps in all cases would be absurd. Many of our lessons in school involve practice,

imitation, and repetition of things with which the children are already tolerably familiar, as well as much direct communication of information and guidance, based only on ideas which the children already possess. In such lessons, the ideas which the children already have are called up and recombined; but there is no systematic attempt to get the children to frame totally new ones, though it does not follow that new ideas may not arise incidentally. It is only where definitely new conclusions or generalisations are to be arrived at that such a method as that just sketched can be employed.

If definition is arrived at in connection with such exercises as these, it is of great value to the children. It not only makes clear the results of their observations and comparisons, and fixes those results in their minds in a definite form, but it is a training in exact thought. It is a beginning in the work of the scientist. And though the children may never go on to analyse the universe, or even a large part of it, the clear ideas they have thus framed will help them in many circumstances, and may form the nucleus of much exact thinking which would not otherwise have taken place.

It is necessary, however, once again to caution the teacher against insisting on exact definitions at all times, especially in the case of young children whose stock of abstract ideas is small. The rough generic ideas of the child are quite satisfactory for ordinary purposes. The teacher would unnecessarily worry the children, and himself, if he demanded exact logical definitions of all the words occurring in school. Nobody has ever defined all the terms he uses. Even the philosophers use a great many words which they would not at all like to be asked to define. It is sufficient in many cases if the child can show by his use of a word in a sentence that he understands its meaning. Definitions should not be required except in the higher classes of the school, and even there they should only be given in connection with important things which serve as landmarks in the subject dealt with.

It should be noted that we have throughout distinguished between *generic* ideas and *abstract* ideas. We have seen

how generic ideas tend to take on, or to be analysed into, abstract ideas, and thus acquire definite connotation in addition to the definite denotation which they originally possess. The opposite process takes place in the case of the simple abstract ideas. They tend to be used to signify the *things* which possess the quality, as well as the quality itself. Thus the child who has distinguished *white* and *black* as qualities can think of *all white things* and *all black things*. Every abstract idea has thus a potential reference to a class of things. When this reference is explicit in the mind the idea is said to be *generalised*. So we see that, although the two kinds of meaning—denotation and connotation—are always distinguishable, a given word can call up both. Hence some writers are content to use the terms *abstract idea* and *general idea* interchangeably.

The term *general idea* must be carefully distinguished from *generic idea*. Both have this in common, that they refer to classes of things. But the former implies that the connotation is definitely known, while the latter includes only ability to recognise members of a class, *without* any abstract knowledge of their qualities. Gener*ic* ideas are possessed by the higher animals as well as by man; gener*al* or abstract ideas seem to be the prerogative of man. Gener*ic* ideas have been referred to by some writers as "*re*cepts," to distinguish them from gener*al* ideas or *con*cepts.

It has already been shown that ideation is involved in *observation, imagination,* and *description*. The first of these processes both depends on ideation and ministers to its further development. Imagination and description are obviously dependent on previous observation. They are usually conducted under the direct guidance of words and their meanings. All description involves ideation both on the part of the speaker and of the hearer. The former starts with images of what he has seen. But he cannot give the hearer these images. He produces *sounds*. And these sounds must *mean* something, both in his mind and in that of his hearer. The latter puts together these meanings and crystallises out something definite which

usually includes a clear-cut image or series of images, similar in signification (let us hope) to what is in the mind of the speaker.

Thus words and their corresponding ideas play an important part even in the apparently simple process of description. It should be borne in mind, however, that the *images* aroused with the words usually play a very large part in these activities. In other words, the *denotation* of our terms is largely in the ascendant in such cases. For we are dealing with particular events and situations, which have either been actually perceived or which are imagined on the basis of past perceptions and observations.

Still, the ideational "network" produced by the *connotations* of our words remains of great importance. As we saw at the beginning of the last chapter, a number of general terms *taken together* define and limit the whole meaning so that only one interpretation is possible. This is what was meant just now by saying that something definite "crystallises out." Thus, if I say, *A boat was steaming across the ocean*, it is obvious that many images of definite things which might arise in connection with some of the words *taken separately* would be modified by the meaning of the other words. If I paused at *boat*, the image of a small rowing boat might arise in the mind of my hearer. But when he hears *steaming* and *ocean* he is forced to substitute a very different image.

"What, then, is the relation of imagination to conception? It is a somewhat subtle one. No one can be a great inventor, man of science, artist, or man of letters, unless he have both. And the greatest is he who has both in due proportion. The products of conception are general and abstract: the products of imagination are concrete and particular. The function of imagination is therefore to give concrete embodiment to the generalised results of abstract and conceptual thought. The things and processes, the men and women of our daily experience afford the material from which, by analysis and synthesis, our conceptions of the world and of human life are sublimated in the process of thought. The imagination of the artist gives to these conceptions re-incarnation; and in sculpture,

the Apollo Belvedere; in painting, the Sistine Madonna; in literature, Hamlet, are presented." [1]

Strictly speaking, it is only in so far as the *connotation* of our words is in the ascendant that we can truly be said to be *thinking*. In this process, we analyse the concrete wholes of the world into parts which, although they do not exist separately in the reality around us, are eternal realities for thought. In other words, we pass *from particulars to universals*. To appreciate the force of the term *universal*, it is well to reflect that ordinary men still frame practically the same general idea of a *dog* or a *horse* as they did in Plato's time, though countless generations of dogs and horses have long since passed away.

But we do not merely analyse. We reconstruct. Indeed, we cannot do the one without the other. The very process whereby we abstract a quality is, as we have seen, a judgment. But a judgment is a *whole*. The quality singled out is, as it were, replaced again. A judgment thus involves both analysis and synthesis. And when a number of judgments have been made about the same thing or class of things, their common subject is a point of union between them. The various simple abstract ideas which have been singled out by the various separate acts of judgment are synthesised into a general idea or concept of the thing or class of things.

But there is more important synthetic work than this. The qualities and relations which have been abstracted in various portions of experience are seen to have relations to one another, and they are arranged by further judgments into new complexes. Thus I may notice the dog's tongue lolling out after a run, and I may notice a man perspiring after similar exercise. Concerning these I form separate judgments. In my world of thought, however, I can connect them. With my ideas of cause and effect, obtained through many other judgments, I am able to see that in both cases the same cause is at work, but that the dog perspires through his tongue instead of through his skin. I have come to relate my abstractions, and as thus re-

[1] Lloyd Morgan, *Psychology for Teachers*, p. 245.

arranged they form a new system. The human race is continually framing such new systems. In other words, we come to *think* the world instead of merely *perceiving* it.

Our abstract ideas thus get linked together in systems. From separate units abstracted from concrete experience we build a world of thought. Our ideas become linked together, not merely by juxtaposition, but by means of necessary connections or relations which are seen (by further processes of ideation) to exist between them. On account of this implicative value of ideas we are often able to push forward beyond the limits of actual experience. We are able to *reason*. If I see a living hand, I infer with certainty that a body is attached to it, even when I cannot see any signs of that body. When the astronomer Adams noticed irregularities in the movement of Uranus, he proceeded through many chains of ideas to the discovery of a new planet, and was able to indicate almost exactly the direction in which telescopes should be turned in order to bring the planet Neptune to view. Here, once again, we see that ideation does not take place for its own sake, but for the more effective treatment of the concrete.

This process of analysis and synthesis is continually going on. It will probably never be complete. The various scientific text-books give us partial reconstructions of the world in thought. But the field is so vast, and the possible abstractions so many, that we can never arrive at an end. Indeed, it is impossible to exhaust the knowledge of the smallest part of the world. For this has relations with all the other parts. And we should require to know all those as well, in order to understand *fully* the place of this one in the whole. This is what Tennyson meant when he wrote—

> "Flower in the crannied wall,
> I pluck you out of the crannies,
> I hold you here, root and all, in my hand,
> Little flower—but if I could understand
> What you are, root and all, and all in all,
> I should know what God and man is."

The teacher who appreciates the force of this will feel the value of all the observation, comparison, description

and definition which we demand of children. We are helping them to think, to get an intelligent view of the world around them. In other words, we are helping them to develop that power, or—if we consider the physiological aspect—that series of cortical centres, which distinguishes man from the animals: we are developing their rationality.

This power of thinking is not a superficial luxury. The building up of our abstract ideas into systems representing various aspects of the concrete world is not a mere intellectual pastime. Our systems of abstract ideas enable us to understand the world and to turn its forces to our use. This is the meaning of the statement—*Knowledge is power*. It is through the agency of science that man is gradually bringing the forces of Nature under his control. Civilised nations are to-day served by great armies of invisible slaves. And some are beginning to dream of the time when little more will be required than to touch a few buttons in order to cause all necessary things to be done. We soar, then, into the abstract in order to gain a more efficient grasp of the concrete.

As we have already seen, conception always involves judgment. Our concepts, under normal circumstances, occur in sentences, expressed or understood. Now when we are in the realm of thought proper we are interested in ideas and their connections. In other words, we are interested in the universal aspect of experience. Hence our judgments will not be about particular things. It follows that even the subjects of our sentences will be general or abstract terms. Thus, in thinking, we are occupied chiefly with such judgments as, *All plants require food*, *All equilateral triangles are equiangular*. Such judgments are called *universal propositions*. It will be seen that general or abstract ideas are referred to both by their subjects and their predicates. Many of our judgments of every-day life, those used in description and narration, contain true abstract ideas only in the predicate. Take, for instance, *John is pale*, *He is breathless with excitement*. Such statements are known as *singular propositions*.

QUESTIONS ON CHAPTER VIII.

1. Illustrate the value of words in forming abstract ideas by reference to the early teaching of number.

2. How may the maxim *Proceed from the concrete to the abstract* be misinterpreted?

3. What do you understand by the *denotation* and the *connotation* of a term? Is there any connection between the two?

4. What is the value of an observation lesson from the point of view of *ideation*?

5. What is a definition? What is the advantage of the definition *per genus et differentiam*?

6. Why should children be required to frame definitions for themselves, before hearing the correct form which is in the mind of the teacher?

7. Write brief notes of a lesson on the *Nature of a Gas*, indicating clearly how the various ideas are arrived at by comparison.

8. The words *man, dog, boy,* may occur in my mind both during a process of *imagination* and during one of *thought proper.* What difference would there be in the ideas arising in connection with them?

CHAPTER IX.

IDEATION (III.).—REASONING.

WE have seen in the last chapter that ideas become connected together into systems. These systems do not merely consist of ideas considered as independent units. They are in many cases *organic* wholes, owing their existence to more intimate connections between ideas than mere juxtaposition. Ideas are related together in such a way that some imply others. Take the three ideas of *whole*, *greater* and *part*. A person who has acquired these three ideas can only relate them together in a certain way. He can only think of the whole as being greater than a part. Indeed, he cannot acquire the idea *whole* without at the same time developing some notion of the other two. Or take an example from less abstract ideas, which admit of more connections. With the ideas *mothers*, *daughters* and *love* I can frame the judgments, *Mothers love daughters* and *Daughters love mothers.* But if I place both *mothers* and *daughters* as the objects of *love*, I feel the necessity of a new subject. I can fix on *men* or *worthy men* as that subject. But I cannot fix on *apples*, or *pears*, or *virtues*. For I should then have what I recognise as an absurd combination of ideas. It is clear, then, that, if I respect reality, I cannot relate ideas in any fashion. They are of such a nature that certain necessary relations hold among them.

There has been some dispute among philosophers as to the origin of these necessary connections among ideas. According to some, the *mind* makes them, *i.e.* the mind is of such a nature that, as soon as it has certain ideas, it

necessarily relates them in certain ways. According to other philosophers, we become aware of these relations by a process similar to that by which the individual ideas are obtained. This seems to be the more satisfactory view. We do not dig out our ideas one by one. They are abstracted from the concrete in systems corresponding to that concrete. A given idea, therefore, is not a unit, capable of entering into any kind of combination, but rather a link in a chain, with connections already established.

There is thus a higher type of conception which goes on concurrently with the simpler kind sketched in the preceding chapters. It consists not merely in singling out individual ideas from the concrete, but in abstracting several ideas connected together in a system. It is impossible to mark off these two grades of conception very distinctly one from the other. In developing one abstract idea we are of necessity developing one or more other ideas which bear some relation to the first. Thus, even in obtaining the simple abstract idea of *white*, the child may also be forming a notion of *black*. And he is, further, more or less clear that one idea is opposed to the other. But in many of the more complicated cases, conception involves the abstraction of a whole system of ideas, related together in certain ways. We have already noted the example, *The whole is greater than its part.* Such systems are continually being abstracted by observation of concrete happenings. Thus, after observation of many particular examples, we discover that $2 + 3 = 5$, that $2 \times 3 = 6$, that *every effect has a cause*, and so on.

This more complicated process of ideation or conception is usually referred to as *induction* or *inductive reasoning.* If, however, we distinguish sharply between *conception* on the one hand and *reasoning* on the other, and if we denominate the process in question by the former name, we have no need of the word *induction* here. This term is, however, frequently employed, especially in books on the theory of teaching, not only for the higher forms of conception, but often for the more elementary kinds. All lessons which involve the framing of concepts or ideas

by comparison of concrete examples are usually said to follow the "Inductive Method."

Our ideas, then, are connected together in systems of *necessary* relations. It is obvious that the richer our stock of ideas and the more clearly they are grasped, the more familiar we become with the relations which exist between them. As we progress in this way, we are able not only to move about more freely in the world of thought, but to predict or divine new facts in the concrete independently of direct experience. Mental activity of this kind is often prompted by curiosity. As we come to understand something of the world in terms of ideas, there is a thirst to know more, and the pleasure of success incites to increased activity.

Further, the struggle for life often requires that we shall understand more of our environment. When a man is confronted by a new situation which will not allow of his customary methods of acting, he does not, as a rule, continue with futile attempts, but he begins to think, *i.e.* he tries to arouse some system of ideas with which to understand the situation more thoroughly, so that he may be able to tackle it more successfully. Such progress by means of our grip of ideational systems is known as *reasoning*. Any progress in understanding, or adding to our knowledge of, the world by means of abstract ideas may be included under this term.

Now we have seen in the two preceding chapters how ideas arise. They are formed from the concrete in the process of direct experience of that concrete. And this will account for all our ideas, both particular and general, if we remember in the case of the latter that there are ascending degrees of abstractness, and that when once we rise above the first level (which includes, for instance, such ideas as *black, white, red, blue, heavy, light, square, round*) the lower of two levels must be considered as "concrete" with respect to the higher (e.g. *black, white, red* may be considered as "concrete" with respect to *colour*).[1] If,

[1] This more elastic meaning of "concrete" has already been referred to in the previous chapter. It is very important to bear it in mind in the course of what follows. As a rule, it will be indicated by quotation marks.

then, the process of conception, as we have traced it, accounts for all our ideas, it might be asked: How can any further progress be made in the way now indicated by the term *reasoning*?

The answer is that reasoning is not essentially a process of creating new abstract ideas: it is fundamentally a process of utilising the ideational systems which already exist, in order to add to our knowledge of the "concrete" from which those ideas were originally developed. It might be argued that, if we add to our knowledge, we must *ipso facto* add to our ideas. We certainly do add to our "*concrete*" ideas in this way. But the point is that none of the elements out of which the new knowledge is constructed is new. We merely have a rearrangement of old elements. The new knowledge at which we arrive is only a bit more of the "concrete." Such an addition to our "concrete" knowledge need not involve any new *abstract* idea, though it may go far to sharpen and clarify those ideas which we already possess.

To take an example from ordinary life, a doctor knows that different foods produce different effects. But he may require to know what kind of food is best for a particular individual under special circumstances. He may have to "think" about it, *i.e.* to *reason*. In other words, he uses the ideational systems which he already possesses in order to settle this concrete problem. And when the thing is done, he may possess no *new* ideas about food and its effects, though his old systems may have been further clarified and more firmly established. He has, then, "worked out" a bit more of the "concrete" under the guidance of the ideas which he already possessed.

In *conception* we soar to the abstract. But, as was pointed out in the last chapter, the object of soaring to the abstract is, not to remain there, but to gain a deeper understanding of the concrete, and to be able to deal with the latter more satisfactorily. This dealing with the concrete in the light of our ideational systems is *reasoning*.

"*Reasoning*, therefore, involves finding our way about in a portion of the "concrete" under the guidance of the ideational system which corresponds to it. Each higher system

of ideas forms, as it were, a guide-book or map of the "concrete" from which it has been derived. It therefore enables us to go from one "concrete" fact which we know by direct experience (or by being told) to another "concrete" fact which we do not know by direct experience.

A person sometimes hits upon the concrete which he wants by chance. This, of course, would not be reasoning, though, unless he confessed to the nature of his success, other people might not be any the wiser. A beginner at billiards was once being coached by an expert. The latter told him to hit his own ball smartly at a certain point on one side, so as to drive it in a given direction, and added that the ball would describe a certain course. But the beginner was not satisfied. He wanted to know *why* this effect would be produced. It was not sufficient for him to bring off this particular shot. He wished to *understand* the matter, *i.e.* to acquire the necessary ideational system whereby other desirable effects could be produced under varying concrete conditions.

It is important to remember that the abstract by itself can never give us the multifarious fulness of the concrete; it merely lays down a more or less complete scheme or plan of the corresponding concrete reality. In just the same way, a map cannot give us the corresponding landscape in all the richness of perception. It indicates towns here, rivers there, roads in this direction, hills in that. But it cannot show us these things in all their concrete reality.

We are, however, deeply interested in getting to know the real or concrete world. Even if curiosity does not spur us on, it is in many cases essential for existence that we should find out things which we cannot, on account of the nature of the circumstances, perceive. We are, in other words, continually being presented with a portion of the concrete, and we desire to infer another portion. We acquire, of course, much direct knowledge of the concrete in the process of framing our abstract systems of ideas. For we must have considerable perceptual experience in order to obtain those ideas. But when once we have done this, when once we have hit upon the *plan*, we can go

beyond our actual observations, and from a portion given infer another portion which is not perceivable at the moment, but which our abstract scheme indicates as a necessary complement of the former.

Thus, if I know that a house is built on clay soil at the foot of a hill, I infer that it will be damp in the rainy season. In general, we may say that, when we are confronted by any "concrete" difficulty, we try to select some abstract plan to direct us from the concrete, or relatively "concrete," fact which is presented to us (the *datum* of our reasoning) to another fact, the *like* of which we have already perceived in framing our ideas, but which is not immediately perceivable by us in this particular case.

Reasoning, then, always begins with some "concrete" fact or facts, given or known to us; and it ends by the discovery of some other "concrete" fact of which we can frame an idea (based on previous experience), but which is not given in the present instance. And this is possible on account of a system of abstract ideas which governs, or applies to, this particular sphere of the "concrete."

Dr. Bosanquet has expressed the same view of reasoning, though in somewhat different language. Using the term *inference* instead of *reasoning*, he says: "Ultimately the condition of inference is always a system. And it will help us in getting a vital notion of inference, if we think, to begin with, of the interdependence of relations in space —in geometrical figures, or, to take a commonplace example, in the adjustment of a Chinese puzzle or a dissected map. Or any of the propositions about the properties of triangles are a good example. How can one property or attribute determine another, so that you can say, 'Given this, there must be that'? This can only be answered by pointing to the nature of the whole with parts, or a system, which just means this, a group of relations or properties of things so held together by a common nature that you can judge from some of them what the others must be."[1]

Now a guide-book may be used in two ways. It may be employed to identify objects when we come upon them.

[1] Bosanquet, *Essentials of Logic*, p. 140.

And it may be used to find our way from one object which we have already seen and identified to another which we wish to discover. The latter process corresponds most truly to *reasoning*. But the process of identification is a necessary preliminary, and we may therefore consider first those cases in which a "concrete" fact is merely recognised as an instance of an abstract system without any further progress in the "concrete." This process, which is a necessary preliminary to all the more complex forms of reasoning, is known as *explanation*. It is sometimes done under the spur of mere curiosity, but usually it is undertaken, as we have just seen, for a more practical motive. We explain one thing in order that we may predict, or prepare for dealing with, others of like nature.

By *explanation*, then, is meant showing that some fact which has been observed fits into, or is a "concrete" instance of, a certain ideational system which already exists in the mind of the hearer. It is obvious that I cannot explain a fact to you in terms of a certain system of ideas unless *you* also have that system already developed in your mind and ready to be revived when the corresponding words are employed. Thus different explanations are necessary at different stages of development.

"Consider, for example, the following answers to the question: 'Why does the book fall when I loose my hold of it?'

(*a*) Because it is heavy.

(*b*) Because all bodies fall unless prevented from so doing.

(*c*) Because of the earth's attraction.

(*d*) Because all bodies attract each other with a force directly proportional to their masses, and inversely as the square of the distance.

"Which of these answers shall be given depends entirely upon the person who raises the question—the range of his organised experience, of his knowledge, in other words. The first answer might serve for a very small boy, the second for one of eight or nine perhaps, and so on.

"So with all our explanations. We shall have to decide just how far we can carry them. Everything depends upon the systems into which the boys' knowledge is already organised."[1]

It is clear, then, that explanation is the soul of reasoning. It involves hitting upon the system of ideas which corresponds to the "concrete" case. Unless we can do this, we certainly cannot go on to predict anything further of the "concrete."

Some of the instances just quoted were very simple. The answer "Because it is heavy" involves a very crude system of ideas. And many would refuse to call it *explanation.* Some psychologists, however, would descend to still more simple cases for instances. Thus the simplest forms of observation (usually called *perception*) are sometimes cited as cases of reasoning. When a child sees a new cat and calls it by its right name, he may be said to be explaining this new apparition in terms of an idea which he already possesses. But a case such as this involves only a *generic* idea: it is so nearly automatic that it seems absurd to dignify it by such names as *explanation* or *reasoning.*

The analogy of the guide-book will be found constantly useful in helping us to understand what reasoning involves. Each of us frames his own guide-book by processes of *conception* or *ideation.* When he *uses* it, he is said to be *reasoning.* A person who knows his guide-book thoroughly, and is much interested in the things which it indicates, can use it quickly and skilfully on any occasion, whether to identify an object which confronts him or to find his way from one object to another. *He can readily find the page he wants.* So a person who has developed clear systems of ideas, and is interested in the "concrete" corresponding to them, can select swiftly the system he requires to explain any "concrete" situation which presents itself, or to go on to predict what another portion of the "concrete" will be. It must be remembered that we possess a very large number of systems of ideas.

[1] Green and Birchenough, *A Primer of Teaching Practice*, p. 49.

Unless, therefore, they are clearly developed and well arranged, we are likely to fall into confusion when attempting to make use of them. We either select the wrong system, or we fail to select any at all.

In actual practice we usually require very careful scrutiny of what is given, and a clear idea of that to which it is required to pass, in order that the right ideational system for explaining or indicating the connection between the two may be aroused. We are often so taken up with the consideration of these two factors that we are unaware of the fact that ideational machinery must be set in motion by them in order that the necessary progress may be made. It remains true, however, that *reasoning involves essentially the finding of that ideational system which meets the case, i.e.* which covers the field of our "given" and of our "wanted," and is thus able to suggest the "means," or the connection between them.

If we lack the necessary ideational system, scrutiny will not help us (unless it can create the required ideational system by new processes of conception). If, on the other hand, we do not scrutinise our problem carefully, we may call up the wrong system, or we may fail to call up any system at all. We sometimes fail, therefore, from want of ideas, and sometimes from want of careful examination. The latter may be due not to lack of striving, but to the fact that the concrete presented is so complex that we cannot grapple with it successfully. Many cases of failure in reasoning are due to the complexity of a "concrete" which baffles examination.

In such cases we require someone else to explain the matter to us. Observe, however, that *he cannot give us any ideas.* (Teachers should always remember this.) He can only use words. These words excite in our minds the necessary ideas, *if we possess them*, and we are now able to understand the matter. Can we, in such a case, be said to be *reasoning?* Most people would be inclined to answer in the affirmative. But such "reasoning" is of a poorer type than that which is done by ourselves. The words of another call up a system of ideas which we were unable to hit upon by an independent scrutiny of the

"concrete." When once this system of ideas is aroused, and if it is aroused with sufficient completeness, the rest is fairly simple. The traveller who cannot use his guide-book unaided is not so intelligent as the one who can find the page and gain the required information by himself.

In all such processes of interaction between the "concrete" and the abstract, we do not merely satisfy the curiosity of the moment and add to our knowledge of the "concrete." We further develop our ideational systems. For although we have noted that reasoning, as such, does not produce new ideas, it must be observed that, since in reasoning we are dealing with the "concrete," the corresponding ideas are rendered still more definite. In other words, the work of conception is to some extent repeated and improved.

Reasoning, then, shows that we have a good grasp of our ideational systems in a given sphere, and also improves that grasp. In applying our knowledge we render it more definite. Indeed, throughout the whole mental life, we may be said to learn by doing, if only the word *doing* be understood in the widest sense. Reverting once again to the analogy of the guide-book, we may point out that a person gains familiarity with such books *by using them.* In so doing, he improves his knowledge of the town or country with which he is dealing, and this throws fresh light on the meaning of the guide-book.

But there is a still more definite way in which reasoning reacts upon conception. Hitherto we have supposed that there is always a more or less complete ideational system on the one hand, and a knowledge of part of the corresponding "concrete" on the other; and that in reasoning the latter is added to by means of the former. But in actual practice the matter is not so straightforward. In using his guide-book, each of us frequently discovers gaps in it, and is led to fill them up by additional observations. In other words, much conception takes place under the guidance of, and in the service of, reasoning. We cannot wait until we have a complete set of ideational systems before we begin to use them for the purposes of reasoning.

We are forced to grapple with the concrete long before we have satisfactory ideational systems to guide us. It is, indeed, in this struggle that we are led to seek further ideas. As soon as a child has developed a few crude ideational systems, he begins to feel the need of more and higher ones. For those he has do not meet all the concrete difficulties in which he finds himself. Prompted by curiosity, he is continually asking "Why?" "How?" "What for?" And this curiosity may be made the motive for much careful observation and consequent ideation.

We see, then, that in using the ideational systems which we already possess to grapple with new concrete cases, we become aware of our intellectual imperfections. The ideas we already possess are not sufficient to solve the concrete problem. They serve only to make us aware of our need and to guide us in the search for further ideas. They direct us in additional investigation of the concrete. Further observations or experiments are conducted. And in the course of these observations or experiments we arrive at new ideas (by conception). In such cases, then, the process of reasoning can only work itself out by further conception. New ideas are born under the direction of reasoning processes, *i.e.* through the guidance of our observations by the ideas which we already possess.

This is perhaps the highest form of reasoning, and if the word *induction* is to be used for something distinguishable from *conception* on the one hand and *reasoning*, as we have defined it, on the other, it might well be applied to this complex product of both. Now since, as we develop, the processes of conception are more and more conducted, under the guidance of other ideas which demand this further inquiry into the nature of the concrete, since, in other words, our processes of observation and experiment, together with their immediate ideational results, usually form part of a greater and more comprehensive effort at reasoning, it may be said that a large amount of *conception* is to some extent an aspect of *induction*.

As we develop intellectually, we do not go about observing and "picking up" ideas indiscriminately: we have a *purpose*, *i.e.* we have an ideational system which needs

completing. In actual life the order: "Proceed from the concrete to the abstract, and then use the abstract to unravel more of the concrete" cannot be carried out very simply. We often find our abstract insufficient to unravel the concrete; and we have to approach the concrete as learners once again. There is thus a continual oscillation between the concrete and the abstract, the latter continually demanding further illumination from the concrete before it can go on with its work of unravelling.

After the early years of childhood, conception often proceeds not so much by increasing the number of individual ideas as by the development of new systems, formed largely of the old ideas in new combinations, and corresponding, of course, to the new portions of the concrete which are examined. And the process of induction which we have outlined is concerned principally with a re-examination of the concrete to see if it corresponds to the ideational systems which we have constructed in order to explain it. Such tentative ideational constructions are often called *hypotheses*. Often a large number of them are constructed by observation of the concrete in the light of the ideas which we already possess. But, when further examined, or when put to a concrete test, they are one after another found to be wanting. And it may be a long time before the right system to fit the case is finally constructed. When it is at last found, it is due partly to the influence of the ideational systems already possessed, partly to the more careful observation of the concrete. In other words, reasoning and conception are inextricably intermingled.

This purposive production of new ideational systems should be encouraged in connection with the observation lessons of the upper school. In other words, we should endeavour to evoke as much *Heurism* (or real investigation) as is possible on the part of the boys. When, therefore, our lads make guesses at the causes of things, we should not, in the light of our superior knowledge, throw cold water upon their hypotheses. If *any* thought is displayed in their suppositions, we should welcome it,

and, as far as time will permit, allow the pupils to put their ideas to the test.

The following is an ideal example of such a process, carried on under the most favourable conditions by a nine-year-old English boy.

"He finds a kind of rainbow on the floor. He calls his sister to see, and wonders how it came there. The sun shines brightly through the window. The boy moves several things about upon which the light falls, saying, 'This is not it. Nor this.' At last, when he moves a tumbler of water, the rainbow vanishes. There are some violets in the tumbler, which he thinks may explain the colours on the floor, but, when the violets are removed, the colours remain. Then he thinks it may be the water. He empties the glass, the colours remain, but they are fainter. This leads him to suppose that the water and the glass together make the rainbow. 'But,' he adds, 'there is no glass in the sky, yet there is a rainbow, so that I think the water alone would do, if we could hold it together without the glass.' He then pours the water slowly out of the tumbler into a basin, which he places in the sunlight and sees the colours on the floor, twinkling behind the water as it falls."[1]

This example assumes possibly more ideational control then any intelligent normal boy of such an age would possess. But it indicates in an exaggerated form the kind of thing we should try to obtain from our children. In actual practice, the teacher will have to help and direct the observations of the children. But he should be ever on his guard against telling and directing too much. He should always remember that the power of finding out can best be developed by actually engaging in it. His chief business is to awaken a real desire to find out, and to direct the endeavours of the boys only when he sees that

[1] Edgeworth's *Practical Education*, Vol. I., pp. 84, 85 (Passage quoted by Dr. Kimmins in his address on "Science Teaching in Schools" in *Education in the Nineteenth Century*, p. 134). The whole requoted by Green and Birchenough, *Primer of Teaching Practice*, pp. 154, 155.

they are likely to go so far from the road that they will be discouraged.

We have seen that when a child has a good grasp of a system of ideas, he can explain new facts in the concrete for himself. Teachers often make use of this truth to test the child's grasp of a system of ideas. This satisfies the teacher as to the intellectual grip of the child, exercises the latter in employing his ideational systems in the only way in which they are useful (*i.e.* in dealing with the concrete), and at the same time further develops those ideas and their connections in the child's mind.

This process may be called a form of explanation. But in this case we are viewing it from the point of view of the system of ideas rather than from that of the concrete instances. On account of this difference it is often called *application*. The child both shows that he has grasped the ideas and at the same time renders them more definite and efficient by applying them to new cases. Thus, when a child has had a lesson on porous bodies, he can explain why fine sand thrown on writing which is still wet will dry it.

What is an *explanation* from one point of view becomes an *application* when looked at from the other. Thus a little girl of seven years quarrelled with her younger brother with respect to the possession of a chair, which she wished to secure for herself. Her father pointed out another one, exactly like it, saying: "Here you are, one chair is as good as another." She turned the argument deftly by saying to her brother: "One chair 's just as good as another: so you have that one." Her keen desire to keep possession of the particular chair in dispute, and her thorough understanding of her father's argument, enabled her to see that it applied just as well to the arrangement whereby her brother should take the other chair. Her father's use of the statement, "One chair is as good as another" may be considered as an *explanation* of, why she should take another chair. Her own use of the expression showed that she not only grasped the system of ideas but was able to make an *application* of it to a new case (which suited her wishes more).

But *application* often includes more than this. The system of ideas may enable us not merely to recognise and interpret a concrete whole, but to *complete* some concrete instance *when only a part of it is given*. Thus a boy who understands the general circumstances which determine climate can not only explain why a given country has a certain climate, but he can "work out" the climate of a country of which the various conditions are stated. A boy who understands Highest Common Factor and how it is obtained, can find the H.C.F. of any two or more numbers. In such cases the system of ideas enables us to find our way about in the "concrete"; to complete it when parts only are given; in general, to arrive at new results independently of direct experience of the reality in question. This, as we have already noted, is reasoning *par excellence*. It is the discovery of something new by means of the ideational systems which we already grasp.

We have seen that the person who takes a step forward into the "unknown" by himself is reasoning in a truer sense than the one who can only take the step when it is shown to him. We may compare these two kinds of reasoning to the corresponding kinds of constructive imagination. Between the activity of Milton in writing *Paradise Lost* and that of the person who reads and understands that epic, there is the same difference as there is between the person who works out a proof or makes an inference by himself and the one who is only able to appreciate the whole when completed. All these persons acquire a new outlook. But the inventor is doing work of a higher type than the mere appreciator of the invention. The former grasps his preliminary images or ideas so firmly, and possesses such a fund of conative force in connection with them, that he makes his own headway into the "unknown." The latter can only follow on the beaten track.

It does not follow, however, that all types of invention involve more or higher mental activity than all types of understanding. A young child can do some originative work, both in the sphere of images and in that of ideas, long before he can rise to an understanding of the

complex inventions of others. A little boy of two-and-a-half was playing at being a baker. His father, not knowing this, entered the room and asked him for a kiss. "I'm a baker," he replied. His father persisted, asking him: "Well! why won't you give me a kiss?" He answered quite clearly, "Because bakers don't give kisses." His ideational system concerned with bakers represented these men as too dignified for such homely lapses as kissing. Here, then, was a simple case of reasoning (explanation) of the originative kind. Yet this little boy was, of course, quite unable to follow any complex train of ideas originated by somebody else—a proposition in geometry, for example.

It remains true, nevertheless, that originative reasoning is the finest product of human intelligence. It is this kind of mental activity that enables man to make use of his abstract ideas in grappling with his environment, and consequently to deal with it more effectively than the lower animals can. The feebler or interpretative type is chiefly useful in developing systems of ideas, and suggesting lines of attack which may ultimately be of service in originative reasoning. We may, perhaps, speak of the originative kind as *reasoning proper*. It occurs, or should occur, very frequently in connection with the practical pursuits of life. Many who are unable to follow the complex reasonings of others are yet very successful in using the ideational systems they themselves possess with readiness and swiftness in every emergency. And, *vice versa*, some who possess great stores of ideational systems, and are able to follow the most abstruse arguments of others, are singularly feeble when confronted with new situations.

It is to be feared that the schools of the past have unduly exalted this latter type. Many boys who were not particularly rich in ideas, though able to make good use of those they did possess, were unappreciated. They were given no real problems within their power to solve. They therefore appeared dull and stupid. But they have often been remarkably successful in after life, far outstripping their more intellectual comrades. The schools are now waking up to this mistake, and *self-activity* is a word on

the lips of every educationist. In the field of reasoning it is represented by what we have called *reasoning proper*. We shall now examine this process still more carefully.

Reasoning proper is the finding of means to ends by the aid of ideation. It conforms in its plan to the scheme already described. A certain ideational system (in common with many others) has been elaborated (by conception) during past experience from the "concrete" sphere in which the present data, means, and end are to be found. Or, if it has not been sufficiently developed in the past, it is now more completely elaborated. (For we have seen that conception often takes place under the stress of reasoning, and, indeed, that in *all* cases the latter tends to the further development of the former.) This ideational system is now either re-excited or (in so far as it has never been completely extracted in the past) aroused for the first time. The re-excitation or arousal of the ideational system in question is conditioned by a careful examination of the data with a view to obtain the end.

Much of the difficulty in most cases is found here. The data may be complex and confusing, and may thus tend to arouse many ideational systems which are not relevant to the end in view. Or the end may not be kept in mind with sufficient clearness to guide the examination of the data into the proper channels. If, however, the relevant ideational system *is* excited, it enables us to discover the means which connect the data with the end, so that we can pass from the former to the latter.

The word *end* implies that we are "after" something. We have some *purpose* in view. In other words, a *conation* is in progress. This is perhaps more obvious in reasoning than in some of the other states we have lately been considering. On account of this, and because of its great importance in reasoning, we speak of it here, whereas we have neglected to refer to it in dealing with perception, imagination, and ideation. But since these processes, at any rate in their higher forms, are directed by reasoning, it is obvious that, on this account alone, conation is present in them. We shall see later, however, that, even apart from reasoning, they often possess other conative forces. They

all involve some amount of attention, and this, as will be seen later, is determined by, or is an aspect of, or—according to some writers—is itself conation. Here, however, we are attempting to examine, and to trace the development of, mental processes considered as forms of *cognition*. And with the briefest reference to the importance of a force to drive on the machinery, we shall confine ourselves as far as possible to the purely cognitive aspect.

In reasoning we always start from something given. In the higher types of reasoning we start from general ideas and hope to reach some further ideational result. (All this, however, must be considered as "concrete" with respect to a still higher system by which we are enabled to deal with it.) In the "lower" processes of practical life, what is given is some present perceptual situation which we desire to modify in order to produce a certain result. The result at which we hope to arrive is the *end* already referred to.

What is this *end* to us at the beginning of the process? It is obvious that it does not yet exist in perceptual reality; otherwise there would be no need for our efforts. We have, however, a more or less clear idea of the kind of thing we require, and, in connection with that idea, there is an impulse towards its realisation. This impulse, however, cannot work itself out by mere force (though its force is most essential): it must lead to a careful scrutiny of the concrete situation. That situation consists of a certain state of affairs which it is desired to change, so that the situation represented by the idea of the end may be secured. Obviously, then, we require to discover a means whereby the present situation may be converted into the desired one. That means is a missing link in the "concrete" chain. And it can only be supplied (unless we come upon it by accident) from above; *i.e.* we must be able to hit upon that system of abstract ideas which refers to this particular series. Hence we must examine the two known things (present situation and desired situation—the former in its relation to the latter) as carefully as possible. In doing this, various ideational systems may be aroused, only to be found unsuitable. But, sooner or later, the

relevant system may be excited, and this will enable us to discover the missing link. We often speak in this connection of a "happy idea" striking us.

It is related that an intelligent engineer was once dismissed from his post, in spite of his ability, on account of his drunken habits. Some time later, the complex engine which he had supervised got out of order, and after all the engineering staff had failed to set it right, the old employé was sent for. He made a brief inspection, then took a hammer, and made a few taps on a certain part of the machinery. In a trice all was right again. His former master asked him his charge. He claimed five guineas. On being asked to state particulars to justify this sum, he wrote something like the following:—

	£	s.	d.
To tapping with hammer	0	5	0
,, *knowing where to tap*	5	0	0
Total	£5	5	0

The concrete work (the missing link) was not worth much in itself. But the value of the possession of the ideational system necessary to discover what required to be done was perhaps not over-estimated.

In all cases we shall find that success is obtained by making some judgment or judgments with respect to what is given to start with. But as we have seen in the last chapter, every judgment implies an abstract idea—at any rate in its predicate. Hence it is clear that we arrive at our end by means of ideation. And this is the essence of all originative reasoning. Some "happy idea," aroused by our observation of the data, enables us to proceed on the course to which the idea of our end, together with the conation involved with it, impels us. The term "happy idea" is only another name for the conception, occurring in the course of our examination, which opens up to us the system of ideas governing the whole "concrete" sphere.

Let us take first of all a simple example from ordinary practical life. A man finds that a door will not shut. If

he is an expert in these matters, *i.e.* if he has already had much experience with doors of all kinds, the "happy idea," or, as we often call it, the *reason*, will occur to him with little effort. He has dealt with a similar case before, and the reason of that is suggested at once in the present instance. (Why that reason should occur now we shall discover in dealing with the principles of Association in the chapter on Memory.)

But let us suppose that he has never had such a case before. If he is intelligent, he does not continue blindly to push at the door. He examines it. He discovers that it has been *newly painted*, and that the paint has made it a *little larger*, so that it *will not fit into the space which was just big enough for it before the painting*. He has discovered the reason, and he proceeds to get a knife or a plane to remove the paint in the places where it opposes the shutting of the door. (This getting and using of a tool also implies reasoning *somewhere*. For much thought has been necessary to devise an instrument to serve such a purpose as that in question. But this thought has been done by others long ago, and it merely occurs to us now in accordance with the principles of memory.)

Now every man of normal intelligence in a civilised community has formed the abstract idea implied by the terms *newly painted*. And he has also framed the ideas involved in saying that if anything be applied to anything else, the whole is *larger* than either of the parts. Further, he knows that if a thing *just* fits into a certain space, *it will not fit if it is made any larger*. The man in question has gained *all* these ideas in connection with his past experience. They are due to processes of ideation.

In what then is *reasoning* superior to *ideation*? Simply in the fact that *the necessary ideas to solve the difficulty in question are hit upon*, all other ideas which might arise being neglected. The man has found the right page of his guide-book to help him in the present emergency. The given situation was carefully observed and analysed by means of the ideas arising in the course of that observation. Of the qualities and relations brought to light in this observation some were seen to have no connection with the difficulty of

shutting the door. For instance, the man might have examined the state of the hinges, and found that they were quite satisfactory. He might also have examined the door-posts and lintel, and found that they, too, were not abnormal. But other qualities and relations were seen to be connected with the trouble, and means were hit upon to deal with them. We see, then, that even this apparently simple case involves a large system of ideas, and that it was necessary for thought to travel along these trains of ideas before the problem was solved.

Much has been written on the question whether any of the higher animals, such as dogs and elephants, can or cannot reason. If, however, we deny to them the power of forming abstract ideas, it follows at once that they cannot. They see things *as wholes*. They cannot by conceptual analysis break them up into their parts and discover the relations between those parts, so as to modify or rearrange them. Many wonderful stories have been told of the intelligence of dogs. But it is necessary to remember the caution of Principal Lloyd Morgan: we should never suppose a more complicated mental process than is absolutely essential to account for any action. There is no doubt that very often considerable additions are made to the feats of these dumb animals—often in good faith—by their human admirers. In practically all cases, however, it will be found that the higher type of ideation which is known as abstraction is wanting. Thus Professor James writes as follows:—

A friend of the writer gave as a proof of the almost human intelligence of his dog that he took him one day down to his boat on the shore, and found the boat full of dirt and water. He remembered that the sponge was up at the house, a third of a mile distant; but, disliking to go back himself, he made various gestures of wiping out the boat and so forth, saying to his terrier, 'Sponge, sponge; go fetch the sponge.' But he had little expectation of a result, since the dog had never received the slightest training with the boat or the sponge. Nevertheless, off he trotted to the house, and, to his owner's great surprise and admiration, brought the sponge in his jaws. Sagacious as

this was, it required nothing but ordinary contiguous association of ideas.[1] The terrier was only exceptional in the minuteness of his spontaneous observation. Most terriers would have taken no interest in the boat-clearing operation, nor noticed what the sponge was for. This terrier, in having picked those details out of the crude mass of his boat-experience distinctly enough to be reminded of them, was truly enough ahead of his peers on the line which leads to human reason. But his act was not yet an act of reasoning proper. It might fairly have been called so if, unable to find the sponge at the house, he had brought back a dipper or a mop instead. Such a substitution would have shown that, embedded in the very different appearances of these articles, he had been able to discriminate the identical attribute of capacity to take up water, and had reflected, 'For the present purpose they are identical.' This, which the dog did not do, any man but the very stupidest could not fail to do.

"If the reader will take the trouble to analyse the best dog and elephant stories he knows, he will find that, in most cases, this simple contiguous calling up of one whole by another is quite sufficient to explain the phenomena."[2]

As an example of a case in which ideation is certainly necessary, and in which, consequently, the dog does not shine, we may take the following incident cited by Principal Lloyd Morgan:—

"Dr. Alex. Hill's fox-terrier Peter was taught to open the side door of a large box by lifting a projecting latch. When the door swung open he was never allowed to find anything in the box, but was given a piece of biscuit from the hand. The development of the situation was always to the end of thus obtaining a bit of biscuit outside the box. One day a well-browned, hot, redolent chop-bone was put inside the box, which was placed in a courtyard so that the dog would pass it when nobody was near, though he could be watched from a window. Details of the dog's behaviour are given by Dr. Hill in *Nature* (April 16, 1903,

[1] The nature of this association will be explained in our next chapter.

[2] James, *Principles of Psychology*, Vol. II., pp. 349, 350.

page 558). The net result was that the dog failed to apply at once his quite familiar experience of lifting the latch in the usual way. The situation, lonely box and exciting grilled bone inside, was not assimilated to the familiar box-master-biscuit situation, and the central feature common to both—the lifted latch—was not grasped. He had no experience of finding bones, or anything to eat, inside; the meaning of lifting the latch was always, for him, the getting of a piece of biscuit from outside, and he failed to draw the conclusion, so obvious to us, that opening the door was the key to the practical problem before him. He failed to assimilate the new presentations to his previous experience—or so it seemed. We may perhaps infer that he did not analytically compare the two situations so as to disentangle the essential features common to both.

"Many cases of apparent stupidity in children (an interesting field of inquiry) may be explained on similar lines. They are due to incapacity or temporary failure to grasp analytically some important feature embodied in the present situation—a feature obvious enough to us, but not seen by them, as the hinge on which the successful application of experience turns."[1]

Such cases as this emphasise a most important point on which we have already touched, but to which it is worth while reverting in this connection. A given ideational system does not represent the whole of the corresponding concrete. We abstract certain features or aspects only. The concrete comprises a much richer variety than any abstract system of ideas can hope to portray. Now a number of concrete situations which present themselves to us may differ widely in many respects, though they are all instances of some given abstract system. The intelligence of the reasoner is shown in *seeing the one in the many*. A person who has been trained by practice to deal with a given concrete situation may go on to deal with practically similar situations in a mechanical way which involves no reasoning. Dogs and elephants can

[1] Lloyd Morgan, *Psychology for Teachers*, pp. 109, 110.

be got to do this. But when the situation is somewhat different, so that it does not awaken the same *generic* idea, and thus set the usual response in action, it requires the penetration of a reasoner to see that the essentials for the purpose in view are still present. Reasoning is thus the power to deal with partially new conditions. So long as we can go on in exactly the same way as before, no reasoning is required. It is when we are arrested by altered circumstances that thinking is necessary.

When a practical difficulty has once been solved, all fairly intelligent people can see that a way out has been found. They can see more or less clearly that the "happy idea" suggests the necessary connection between the original situation and the end to be achieved. Can *they* be said to reason in so doing? We have already seen that this is usually called reasoning, though it is of a lower and less active type. When once all the ideas are aroused in their minds, they are able to appreciate the connections between them. In other words, they are capable of sufficient conceptual power to understand the thing when it is done. But their familiarity with the necessary ideational system was not sufficiently great to permit of its being aroused in connection with their unaided examination of the data.

Sometimes, however, their ideas *are* sufficiently organised, but there is not enough conation to make the best of them. For to bring ideas out clearly keen attention is necessary both to the data and to the idea of the end; and this can only be secured by strong conative force. To put the matter simply, there are some people who could solve a given problem, if only they could be brought to try hard enough.

Now this has important bearings on the work of the teacher. Part of his task is to get his pupils to reason. Let us take one of the spheres of school work in which reasoning is required—the solving of "problems" in arithmetic. Boys can be trained to do the ordinary calculations in a somewhat mechanical fashion. But it is often found that when they are given "problems" to solve, they are at a loss. They are inclined to "toss

up" in order to decide whether addition, subtraction, multiplication, or division is the best solution.

Some teachers attempt to meet the difficulty by thrashing out the problem beforehand with the class. They often get some assistance from the boys. But it is usually from a few of the sharpest. The average boy waits until the thing is done, and he is then able to understand it well enough to work it over again, or to do another like it. The dull boy often fails to rise even to this level. Now it should be borne in mind that if the teacher explains the problem first, the *reasoning proper* is done by *him*. It is poor satisfaction to set the boys on to do the problem when the lines of its solution have already been laid down. For the mechanical calculation is all that remains. And exercise in this is not the chief purpose in setting problems.

Many teachers pay too much attention to *results*, too little to the *processes* by which those results have been obtained. Their chief object seems to be to get the boys *somehow* to produce correct answers to problems. And their means consist in thrashing out, with or for the boys, all the types of problem which they imagine can be set by an examiner. They are, of course, much annoyed when the examiner produces a type of problem somewhat differing from any of the types which their boys have learned to "do." And they are inclined to suspect the examiner of malicious intent.

Now there are examiners whose chief delight seems to lie in "stumping" their unhappy victims. And it is well to remind these gentlemen that it is more easy to expose the ignorance of a class than to discover its knowledge. This applies as much to arithmetic as to all other subjects. But in the realm of *problems*, the examiner does not as a rule go outside the *knowledge* of the boys. His problem, however, while it requires a basis of knowledge, necessitates a higher faculty—that of *reasoning*. He does not wish to find out whether the boys have learned to do problems like those that the teacher has explained. He wishes to test their powers of attacking problems *for themselves.* And if any complaint is to be made with

respect to the problems set in the past, it is that examiners have not set more of an original kind, and that, consequently, many teachers have felt themselves justified—or at any rate "safe"—in working over with their pupils a variety of typical problems, some of which were almost sure to occur in the examination.

There is no doubt that the understanding of a number of typical problems and the working of a few examples of each will be of some value to the pupils. It will make their ideas clearer and more interconnected. It will strengthen the basis on which originative reasoning must work in the sphere of problems. But if it is carried on too far, it induces the wrong attitude of mind. The working of problems becomes almost as mechanical as the numerical calculations themselves. The boys can do what they have been shown how to do, but are helpless in face of a strange situation. It is necessary, therefore, to introduce some changes in the nature of the problems very early. It should also be a frequent practice to set boys problems and to leave them to struggle with their difficulties unaided.

It is not meant that problems should be thrown at the pupils in careless and irresponsible fashion. What is necessary is that the teacher, instead of devoting his chief energies to showing the boys how to work the problems found in the ordinary books on arithmetic, should expend the greater share of his attention in devising problems which will call out the reasoning powers of the boys. He must bear in mind two important points. The problems must in the first place be within the compass of the knowledge of the boys. And, secondly, the boys must be sufficiently interested in them to attack them with vigour.

Many of the problems found in the arithmetic books deal with conditions which are never likely to occur in actual life—least of all in the lives of the boys. The boys learn in a mechanical way to attack them, but they do so under the guidance of the teacher; they themselves do not realise the full meaning of the words. This is evidenced by the absurd answers which many of the boys produce—

answers which would *at once* appear ridiculous to a person who really understood the nature of the problem. Even under the present regime, and with the artificial problems that are often set, the teacher would do well to spend his "preparation" period, not in indicating how the difficulty is to be attacked, but in examining the nature of the given problem with the boys, thus ensuring that they thoroughly understand what is postulated and what they are required to produce from it.[1]

Now both the essential preliminary conditions of reasoning—an understanding of the data and a strong impulse or conation towards finding the solution—will usually be obtained if the problems set are *living* ones. It has been suggested by some writers that, especially with the younger children, all arithmetic—both the mere calculations and the problems—should be taken in connection with practical work, should, in fact, grow out of the things they are doing, as it does in the work of the world.

A boy is not really interested in finding the amount of paper necessary to cover the walls of an imaginary room. He can, of course, be interested by external reasons. He may work hard at his problem in order to distinguish himself, or in order to get out to play. But there are quite enough other tasks in school which require external incentives. And the teacher should husband his forces. Wherever it is possible to create an interest within the subject, that should be done. If the boy has himself made a box and is lining it with paper, he will be very keen on finding out how much he will require. And his calculations in *inches* will be quite as intricate as those in *yards* which would be necessary for the imaginary room.

A good example of the way in which a boy acquires an

[1] The writer remembers a student coming to him with a difficult problem. He began his attempt to help the student by setting down clearly the data. Before he (the writer) had had time to see the solution himself, the student exclaimed, "I see it now," and went away satisfied. The student was, of course, already partially acquainted with the conditions laid down, and the greater clearness induced by the systematic statement of them was sufficient to enable him to see his way without further explanation.

interest, even in difficult things, when they affect his own schemes, is given by Professor Adams. "John," he tells us, "was a perfectly normal type—clever and very careless. Suddenly the mathematical master reported an amazing improvement in John's marks. On investigation the improvement was found to limit itself to mensuration. Still further inquiry narrowed down the prodigy to areas of segments of circles; but as those could not be understood without previous work, John asked and obtained permission to work from the beginning. In three weeks he had bored his way honestly through half of Todhunter's *Mensuration*, and was very eager to be promoted to the volumes of spheres. John was now the talk of the masters' room, where nobody had a good word to say for him except the science master, who reported that John had developed a violent interest in Chemistry, and was showing leanings towards volumetric analysis. The whole trouble was afterwards traced to its primary bacillus in a gigantic balloon that John was projecting. How to cut the gores drove him to Todhunter; how to calculate how much zinc and sulphuric acid were necessary to float his balloon with hydrogen had urged him to Chemistry. Balloon-making did not make either mensuration or Chemistry easy; it made them interesting."[1]

Space will not permit an examination of all the other departments of school work in which reasoning may be developed. But similar remarks would apply in these cases. Wherever possible, the teacher should get the pupils so interested in their work that they will be willing and anxious to reason for themselves.

Most writers distinguish two kinds of reasoning—*deduction* and *induction*. In *deduction*, they tell us, we pass from general laws to less general laws or to particular cases; in *induction* we proceed from the examination of particular cases to the formulation of general laws. We have already used these two terms in speaking of methods of teaching in the last chapter. Examination of those

[1] Adams, *The Herbartian Psychology applied to Education*, pp. 264, 265.

methods will show that they are largely in harmony with the definitions we have just given.

But closer examination will show that the *reasoning* processes involved in *deduction* and *induction* are similar. *Deduction* corresponds approximately to what we have called *application*, and *induction* to *explanation*. But we found that *application* and *explanation* are not at bottom fundamentally distinct. In both cases an ideational system is necessary, and a given particular case is brought under it. When we consider the matter from the starting point of the ideational system, we use the term *application*; when we begin with one or more particular cases and reach the system which underlies them, we are more inclined to employ the term *explanation*. But we can employ the term *application* in a broad sense for both operations. For in both cases we are applying our ideational systems to particular instances. So it must be with the corresponding terms *deduction* and *induction*.

But we are often told that in *induction* we start from particular facts and arrive at general statements *of which we had no idea beforehand*. Now these general statements consist of ideas in certain relations. And we have already given a name to the process of arriving at general ideas from the concrete. That name is *conception* or *ideation*. And there is no reason why it should not be employed in complex cases as well as in the more simple ones. *Induction*, therefore, thus understood, is only another name for the higher forms of *conception* or *ideation*.

Since the two terms *deduction* and *induction* are so frequently employed, it will be well to consider further instances of the processes usually included under them.

First, of *deduction*. The books on logic usually give some instance similar to the following:—

> All rodents have chisel-teeth.
> All mice are rodents.
> Therefore all mice have chisel-teeth.

This form of stating the results of reasoning is known as the *syllogism*. The first two statements are called the

premisses (or data), and the last proposition is called the *conclusion*. It will be noted that there are not only three propositions, but three terms, which indicate three concepts or ideas. The form may be generalised by substituting letters for the terms. We then have—

Every M is P.
Every S is M.
$\therefore$ Every S is P.

It will be noticed that one term (M) occurs in each premiss, but not in the conclusion. It indicates the idea through which the conclusion is reached. It is called the *middle term*.

Now it may occur to the reader that if the two premisses are already known, little if any effort is required to pass to the conclusion. The work is practically done! Any intelligent person could state the conclusion. Where, then, does the *reasoning* occur? It consists in finding amongst the knowledge which we already have the right premisses for our particular purpose. The statement of the premisses (with their conclusion) is possible only *after* the reasoning has taken place. Often, indeed, a person *begins* with the conclusion, *i.e.* he "feels certain" of its truth, but is desirous of establishing it on a solid ideational basis. If the schematic syllogism for such a case be examined, it will be found that of the three terms S, M and P, I am already acquainted with S and P, although I may not be sure of their universal connection. There is only one other term to be "discovered"—the middle term.

We see, then, that the middle term indicates the ideational system or reason which guarantees the conclusion. The task, indeed, is *to find the middle term.* The essence of the reasoning, therefore, consists in lighting upon this "happy idea." Mice are thus found to have chisel-teeth, not on the basis of direct observation, but on the ground of an ideational system (*rodents* and their properties) which has already been formed during the course of past experience, and which guarantees the present step forward, independently of further observation. Instead of re-examining this particular species (*mice*) we rely on the

abstractions which have already been made in connection with the formation of the genus (*rodents*).[1] Our original syllogism would more faithfully represent the process of thought if it were expressed—All mice have chisel-teeth, *for they are rodents.*

Often the conclusion (*i.e.* the conclusion of the *syllogism*; we have seen that it is often the *starting-point* of our reasoning, the *establishing* of it being our real end) is not so definitely thought of as we have supposed in the case just examined. I may only know the subject (S) to begin with, but I may have a vague idea of something (P) which could be predicated of it, if only I could find the "happy idea" (M), or, more properly, the ideational system which will guarantee it.

Thus, I may begin by thinking about the area of a triangle. I may not know the formula for it, but I may be dimly aware that one is to be found, if only I can think of an idea which will lead to it. Of course, if I know nothing of mensuration or of plane figures, I am not likely to succeed. But suppose that I know something of triangles and parallelograms. I may have learned that every triangle is half the parallelogram constructed on the same base and with the same height. I may also have learned that a parallelogram has the same area as the rectangle constructed on the same base and with the same height. Lastly, I may have learned that the area of a rectangle is $b \times h$. From all this it follows that the area of half a parallelogram is $\frac{b \times h}{2}$. If, then, I think of a triangle as half a parallelogram, my conclusion is reached. I can state the reasoning in the form of a syllogism, as follows—

The area of half a parallelogram is $\frac{b \times h}{2}$.

The area of any triangle = the area of half a parallelogram (on same base and of same height).

Therefore the area of any triangle = $\frac{b \times h}{2}$.

[1] The same economical process was referred to in connection with classification and definition (p. 144 ff.).

It is now obvious that the essential point of the reasoning consists in conceiving the triangle as *half a parallelogram.* This concept is the middle term. It may be objected that I already had this concept. Without it, indeed, I could not achieve my result. The point, however, is that I could conceive a triangle in many ways—as a figure whose three angles are equal to two right angles, as a figure round which a circle can be described, as a figure any two of whose sides are greater than the third side, and so on—but I was sufficiently acute to see that only one way of conceiving a triangle (as half a parallelogram) would lead to the end I desired to attain. The course of my reasoning may best be indicated by the statement: The area of a triangle, *being half that of the parallelogram on the same base* (b) *and of the same height* (h), *is* $\frac{b \times h}{2}$.

We see, then, that in *deduction* the essence of the reasoning consists, as in all the other cases, in lighting upon the "happy idea." This "happy idea" is one way of conceiving or judging the data with which I start; it involves the consideration of those data from a certain point of view—from the point of view of that ideational system which guarantees the connection between data and conclusion. Or, reverting once again to analogy, it may be said that the "happy idea" is like the turning-up of the right page of my guide book, or of the right map in my atlas, to help me in the given situation.

It remains now to examine what is usually called *induction.* Let us first take as an example one of the most common lessons usually given on "inductive" lines—the lesson which leads from examination of particular cases to the statement of the general or universal truth that *All metals expand when heated.* The teacher performs a number of experiments, heating iron, brass, and perhaps other metals of different shapes and sizes, and allowing the boys to notice that they all expand. He then invites them to frame a general statement about metals. (Sometimes, indeed, he ventures to jump to a statement with respect to all *solids*!)

Is he justified in doing this? Obviously he is not. All that the boys have a right to state is that the metals *which they have observed* expand. They have no right to generalise and say: *All* metals expand when heated. "The generalisation suggested is only the first wild guess of the untrained mind; to treat it as a valid inference is to introduce utter confusion into all conception of scientific method."[1]

This process is sometimes justified and described as *reasoning by analogy*. But it is not *reasoning*; for it produces no *reason*. It amounts to saying: Metals are alike in some respects; I have seen some expand under heat; therefore all the others will do so. But there is no ground for such a conclusion. At the most it can be called only a suggestion or hypothesis, demanding verification before it can be accepted definitely. "It is this tendency to substitute guess-work for real investigation . . . which has made the ordinary 'practical' man so suspicious of what he calls 'theory' and so fond of contrasting it with 'practice,' and of telling us that 'an ounce of fact is worth a ton of theory.' No doubt this is so if the 'fact' is true and the 'theory' false, but between true theory and real fact there is no opposition at all."[2]

Of course, where the resemblances are known to be connected with the occurrences inferred, the matter is quite different. Thus it would be absurd to argue from the resemblances of two bodies in colour, size and shape, that because one floats on water, the other will likewise do so. But if, neglecting all these resemblances, I happen to know that they resemble each other in weight, I can be confident in asserting, on the ground of this single resemblance, that if one floats on water, the other will do so as well. But in such a case, "our argument ceases to be analogical and becomes demonstrative, our conclusion passes from a supposition or hypothesis into an established truth."[3] In other words, I have hit upon an ideational system (that connected with weight) which enables me to

[1] Welton, *The Logical Bases of Education*, pp. 259, 260.
[2] *Op. cit.*, pp. 170, 171.
[3] *Op. cit.*, p. 181.

pass from one concrete case (of floating) which is given, to another which I can infer.

What, then, is the teacher to do in such a lesson as that on the expansion of metals by heat? After a number of experiments, he should refer to many other instances, and finally *tell* the boys that men have found *all*[1] metals expanding with heat. This is not a process of *reasoning*, but it is far better than inducing the boys to jump to conclusions with insufficient grounds. "One of the chief advantages derived from the teaching of natural and physical science should be the recognition by the pupils of the difficulty of arriving at truth, and of the need of caution in making inferences from insufficient evidence."[2]

It might be asked: What is the use of the experiments, if the boys have to be *told* the general truth in the end? Their chief use is to enable the boys *to conceive clearly* the nature of that truth. They form the basis of ideation. But that ideation, in so far as it is entirely determined by them, cannot be called *reasoning* in the sense we have specified in this chapter.

Many other so-called "inductive" lessons in school are likewise devoid of reasoning in the strict sense of the term. They require careful observation and comparison of several particular cases, and the consequent noting of some common characteristic. This, once again, involves ideation or judgment. But it is a judgment prompted entirely by the observations made. It does not involve the selection of an idea or system of ideas with a distinct consciousness of an end to which that ideational system will point the way. It is, in so far as it is not guided by some other system of ideas, nothing more than *conception* or, if we may so style it, *simple ideation*. The lesson sketched in the last chapter on adverbial phrases and clauses was of this type. The *teacher*, of course, sees the end to which the lesson is leading. But from the nature of the case the boys cannot do so. They have not yet formed the ideas in question, and can only arrive at them by making

[1] There are, of course, a few slight exceptions.
[2] Welton, *op. cit.*, p. 260.

observations under the teacher's guidance. This is, of course, a most important exercise, and many lessons are quite rightly conducted on this plan. It may, perhaps, still be called the "Inductive Method," so long as we are quite clear as to its character. The term "induction" has now become very common as applied to such lessons, and it might only lead to further confusion to attempt any change in terminology.

It should always be borne in mind, however, that if the term *induction* is to be used to imply *reasoning*, it must include the finding of a satisfactory explanation for something observed. Not mere *conception* should be called *induction*, but conception *with a purpose*, *i.e.* guided by other ideas. In other words, the term *induction* is best employed, as already suggested earlier in this chapter, for those cases in which the ideas we already possess are found insufficient to explain the phenomenon in question, and consequently direct us to further observation of the concrete. When we find the reason or explanation among the ideas which we *already* possess, the process is usually said to be a case of *deduction*. When we have to search for *new* ideas, it may be called *induction*. But in both cases the *reasoning* process is the same; it involves an understanding of the concrete in the light of the abstract.

The error, then, of the ordinary loose views of "induction" is that they often omit to emphasise the essential characteristic—the *reasoning*. They fail to note that the observation or experiment leading to the new system of ideas must be determined by, or be part of, a larger process —the effort to fill up gaps in a system already existing, *i.e.* the desire for a complete explanation. When observation or experiment is undertaken by a child at the suggestion of his teacher, and merely leads to a conceptual summary of the concrete cases dealt with, we ought not to speak of "inference" or "induction," but merely of *conception*. It is only in so far as the observation or experiment is really a stage in the solution of a wider problem that we can call it a part of an inductive inquiry. This is eminently the case when the boys themselves

suggest and carry out the observation or experiment. We get inductive inquiry, therefore, in the most real sense, when the method of *Heurism* is adopted.

Some educationists would like to see *all* observation in school of this character. But if we are to profit by the results of the investigations of countless generations, it is clear that we must often choose methods of framing ideational systems in the minds of the boys which do not correspond to the long-drawn-out struggles of the many intelligent individuals who have collectively obtained those systems. Sometimes, therefore, we content ourselves with merely giving the net results of much previous human inquiry. In other words, we *tell*. Now in doing this, we use words. And if our telling is to be successful, each of these words must *already* have a meaning in the minds of the boys.

We cannot communicate individual simple ideas. All these *must* be obtained through conceptual processes *by the boys themselves.* There is no alternative, except in the case of new arrangements or new systems of *old* ideas. In such instances we have the choice between requiring the new system to be discovered by investigation in the concrete, or telling it. In the latter case, the boys revive their old ideas and rearrange them into the new system under the guidance of our words. We adopt this course when the investigation is far too big a process to admit of even a feeble imitation of it in school.

Thus, in the lesson on the expansion of metals, it is very doubtful whether the boys could ever undertake the whole inductive inquiry which has at length secured a tolerably satisfactory ideational ground for the general law. They can, however, be led to appreciate in some degree the nature of that inquiry. If they proceed with their study of matter, they may later be led to understand that matter is composed of molecules, held together by a force which we name cohesion. They may also learn that heat is another force which acts in opposition to cohesion. They will now be able to see a *reason* for this expansion of metals, and indeed of other solids. The final result can be expressed, once again in syllogistic form, as follows :—

All overcoming of cohesion causes expansion.
Heat overcomes cohesion.
Therefore heat causes expansion.

Here the middle term or reason is *the overcoming of cohesion.* And the process of thought may best be indicated by the form—Heat causes expansion, *because it overcomes cohesion.*

We see, then, that the *reasoning* in *induction* and in *deduction* is of the same type, and can be expressed in syllogistic form. The chief difference between the two is that in *induction* there are also involved processes of observation or experiment to complete the ideational system which guarantees our conclusion. Archbishop Whately summed the matter up very well when he wrote—

"Much has been said by some writers of the superiority of the Inductive to the Syllogistic method of seeking truth—as if the two stood opposed to each other—and of the advantage of substituting the Organon of Bacon for that of Aristotle, etc., which indicates a total misconception of the nature of both. There is, however, the more excuse for the confusion of thought which prevails on this subject, because eminent Logical writers have treated, or at least have appeared to treat, of Induction as a kind of Argument distinct from the Syllogism; which if it were, it certainly might be contrasted with the Syllogism: or rather, the whole Syllogistic theory would fall to the ground, since one of the very first principles it establishes, is that *all* Reasoning, on whatever subject, is one and the same process, which may be clearly exhibited in the form of Syllogisms. It is hardly to be supposed, therefore, that this was the deliberate meaning of those writers; though it must be admitted that they have countenanced the error in question, by their inaccurate expressions.

"This inaccuracy seems chiefly to have arisen from a vagueness in the use of the word Induction; which is sometimes employed to designate the process of *investigation* and of collecting facts; sometimes the deducing of an inference *from* those facts. The former of these pro-

cesses (viz. that of observation and experiment) is undoubtedly *distinct* from that which takes place in the Syllogism; but then it is not a process of *argumentation*; the latter again *is* an argumentative process; but then it is, like all other arguments, capable of being Syllogistically expressed. And hence Induction has come to be regarded as a *distinct* kind of *argument* from the Syllogism."[1]

"Take another example. I am sitting in a railroad car, waiting for the train to start. It is winter, and the stove fills the car with pungent smoke. The brakeman enters, and my neighbour asks him to 'stop that stove smoking.' He replies that it will stop entirely as soon as the car begins to move. 'Why so?' asks the passenger. 'It *always* does,' replies the brakeman."[2]

Now this would be called "induction," if the vague use of the term already considered were allowed. It would, indeed, be a more satisfactory case than that dealt with in connection with the observation of a few metals expanding with heat. But it is obvious that the brakeman has not *reasoned*. He has merely framed a judgment after observation of particular cases. This judgment merely arises from and sums up his observations. *It does not lead beyond them.* "But, if the passenger had been an acute reasoner, he . . . might have anticipated the brakeman's reply, and spared his own question. Had he singled out of all the numerous points involved in a stove's not smoking the one special point of smoke pouring freely out of a stove-pipe's mouth, he would probably, owing to the few associations of that idea, have been immediately reminded of the law that a fluid passes more rapidly out of a pipe's mouth if another fluid be at the same time streaming over that mouth; and then the rapid draught of air over the stove-pipe's mouth, which is one of the points involved in the car's motion, would immediately have occurred to him.

"Thus a couple of extracted characters, with a couple of

[1] Whately, *Elements of Logic*, Ninth Edition, p. 151. The word *argumentation* is, of course, used as equivalent to *reasoning*.

[2] James, *Principles of Psychology*, Vol. II., p. 342.

their few and obvious connections, would have formed the reasoned link in the passenger's mind between the phenomenon, smoke stopping and car moving, which were only linked as wholes in the brakeman's mind."[1]

We may sum up the reasoning in syllogistic form as follows:—

> Air passing over top of pipe causes smoke to be drawn out.
> When car is in motion air passes over top of pipe.
> Therefore when car is in motion smoke is drawn out.

The most important idea, then, is that air passes over the top of the pipe (when the car is in motion). And the process of reasoning may be best expressed by saying: The smoking of the fire will stop entirely as soon as the car begins to move, *because then the air passes over the top of the pipe.*

As Professor James describes this instance, it is a case of *deduction.* For he supposes the necessary ideational system to be already in the possession of the passenger, so that the latter could have solved the difficulty himself, if he had only troubled himself to examine the matter thoroughly. But the same difficulty might have given rise to *induction.* When "the law that a fluid passes more rapidly out of a pipe's mouth if another fluid be at the same time streaming over that mouth" is not known, it is possible to suppose that a person, being anxious to explain the behaviour of the stove, or to be sure that what the brakeman says is true, might by careful observation and experiment succeed in discovering the law. Having now obtained the necessary ideational system, he is in the same position as James's "acute reasoner." And he could state his argument in the same form (adding, of course, the details of the observations and experiments by which he discovered the law).

We see, then, once again, that there is only *one* process of *reasoning.* If that reasoning proceeds entirely on the basis of previous knowledge, it is called *deduction*; if it necessitates the discovery of new ideational systems to

[1] *Op. cit.*, pp. 342, 343.

complete one's existing knowledge, it is called *induction*. Often it hovers between the two. For there are many cases in which it is difficult to say how far our examination of the concrete has *revived* an ideational system which we already possessed, and how far it has really caused us to *discover* that system.

It must be remembered on the one hand that our ideational systems tend to fade from memory, and on the other that new cases of the corresponding concrete are more or less different. The effort, therefore, to explain another somewhat different case is nearly always a kind of *re*discovery. And in this sense it is inductive in character.

This view makes still more clear—what has already been said earlier in this chapter—that the using of our ideational systems on fresh cases reacts upon conception. We make our grasp of those systems the better by application of them to fresh and partially different instances. The method of conception which we termed the *method of agreement* is thus brought into play. The *one* (abstract) "rolls out" more and more distinctly from the *many* (concrete instances). In this lies the value of all that *application* of general principles which we require after lessons in which those principles have been obtained. Some boys, perhaps, do not really grasp the ideas at all until the stage of application is reached. In the very old days, when what is termed the "Deductive Method" was employed, when the principle or rule was always told first, and then applied to concrete cases, the ideas were still more frequently only grasped during the application. There was a sort of "inductive" process going on during the struggle with the concrete. While the boys were supposed to be applying the principle to concrete instances, they were really slowly understanding that principle in their efforts to deal with those cases.

But, as we have seen, the same thing occurs to some extent even when the necessary system of ideas is fairly well developed. All reasoning involves both the striking of the right system of ideas and the further clarification of those ideas. To this extent it may always be called inductive. We see, then, that actual reasoning is both deduc-

tive and inductive. When the necessary ideational systems are clearly defined, and can be readily used to explain and add to the "concrete" with which we are dealing, we call the process *deduction*. When our ideational systems are distinctly inadequate, and require to be appreciably enriched by additional observation and consequent conception, we call the process *induction*. Or, as Mr. Bradley puts it, "It is not in principle alone that analysis and synthesis are essentially one, but in practice also their unity tends to show itself in the product. Performing one operation we find that ve have also accomplished the other; and we may err in our estimate of the relative importance and prominence of their aspects." [1]

Whately's reference to the "Organon of Bacon" (induction) deserves further elucidation. It is often said that the use of *induction* instead of *deduction* (which latter was during the Middle Ages employed almost exclusively) has brought all the improvements of modern science. This is quite true. What has really taken place, however, is not that we have changed our method of *reasoning*, but that we have ceased to confine our reasoning to the ideas formulated by Aristotle and the ancients. It was believed by the scholars of the Middle Ages that all the ideational systems of any value had already been obtained by the ancients. Consequently only deduction was possible. But gradually, as men began to see the impossibility of explaining many things with the old ideas, this absurd belief decayed. Active thinkers saw the need of further investigation. Reasoning was no longer confined to the using of the old ideas. It is, then, the extension of reasoning to new fields, thus demanding more *conception* or *ideation*, which characterises the new era.

Although—for the sake of clearness of thought—we have shown that, as far as the *reasoning* is concerned, the form called *induction* is not a distinct type, it is necessary to remind the student once again that the term "induction" is usually employed to cover all *conception* or *ideation* in

[1] F. H. Bradley, *The Principles of Logic*, p. 435. *Analysis* and *synthesis* are here used respectively for *induction* and *deduction*

which systems of ideas (expressed by definitions, or general statements, or rules) are arrived at by consideration of a number of concrete instances. When he meets the word "induction" in educational books and in examination questions (*e.g.* those at the end of this chapter) he must be prepared to take it in this sense. Such conceptual exercises should, however, only be called *induction*, in the strict sense of the term, in so far as they form part of a *reasoning* process, *i.e.* in so far as they are undertaken in the attempt to explain something.

Reasoning and creative imagination are the highest types of ideal construction. They are sometimes classed together under the name of *invention*. Both involve some end which is held definitely in view. Both require ideation in the process of reaching that end. But they differ with respect both to the end and to the ideational processes necessary to reach that end.

In reasoning, the end in view is in close touch with reality. In practical affairs it is, indeed, some definite concrete result which is to be actually attained. And even in science, the general propositions which we reach are not obtained merely for the delight of contemplating them. They are aspects of reality, and their purpose is to give us a greater control over the real world. The end of reasoning is of direct utility in the conduct of life. In creative imagination, the end in view is rather an aesthetic enjoyment. The poet and the romancer aspire to paint a world which *might be*.

The process of reasoning is essentially conceptual. Images may occur and may help to guide that process We have seen that the great man of science must be imaginative. Nevertheless, it is to the purely ideational aspect of his thoughts that he must give most attention. His progress towards his end must be through an inevitable chain of ideas. In creative imagination there is still the control of ideas, but the images must be considered to count for much more, especially when it is remembered that the final result is a complex of imagery.

Questions on Chapter IX.

1. What method would you adopt for the more effective training of reasoning in school? Show how you would vary your methods according to the ages of the pupils.

2. Show how the inductive method of reasoning may be employed in lessons on familiar natural phenomena, *e.g.* the seasons, snow, dew.

3. Distinguish between inductive and deductive reasoning, and illustrate the place of each in school work.

4. In what does training to reason consist? Compare the reasoning powers of children at the ages of five, ten, fifteen.

5. What is meant by the "inductive method" in teaching, and to what extent is it analogous to the process of scientific discovery?

6. Finding that a class is weak at problems, though good in ordinary calculation, what steps would you take to remove the weakness?

7. All reasoning involves ideation, but all ideation is not reasoning. Give a definition of reasoning which harmonises with this statement, and illustrate it by examples.

8. Show how reasoning can be exercised in connection with wood work.

CHAPTER X.

MEMORY.

WE have had to refer to *memory* many times already. The chapter on Imagination, for instance, assumed it throughout. Imagination is, indeed, one of the chief products of memory. And ideation, which usually accompanies both images and percepts, is no less dependent upon it. We must proceed, therefore, to examine more closely the whole machinery of memory, and how that machinery functions.

Used in its widest sense, the word *memory* signifies an attribute which is necessary to the mind at all times. Every mental process, whether it is afterwards specifically recalled or not, leaves *some* trace. The nervous tissue which is excited at the time of its occurrence is to some extent modified. And when it is re-excited, the manner of that excitation will be somewhat different because of the former experience; and if this is so, the mental concomitant of the excitation will also be modified. Probably a great amount of sub-conscious learning goes on in this way, without any definite recall of the past experiences to which that learning is due. We can gradually become familiar with a room, so that we move about in it more readily, without any definite attention to this or that peculiarity of it.

Perception, as we have seen, owes much to this sub-conscious accumulation of traces of past experience. And though many of the higher processes of mind require definite *revival* of portions of past experience, they also depend ultimately upon the same general conservative tendency. Indeed, no single mental process can proceed

without this attribute. For if at any given instant of such a process the traces of the immediately preceding instants could be completely obliterated, we should have to begin our effort of comprehension or adjustment to the "new" situation over again. It is impossible to conceive what a mental process could be without this retention of the "just past."

We may sum up all this by speaking of the *plasticity* and *retentiveness* of the mind. Lloyd Morgan uses the term *primary retention* with the same meaning.[1] But the word *memory* is usually specialised to refer to those cases in which this power of retentiveness gives rise to the definite revival of some portion of past experience, in the form of ideas and images. Thus, a person would not as a rule say that he remembers how to walk, or that he remembers that a certain yellow spherical thing (an orange) will give certain tactual sensations when grasped. But he *would* say that he remembers a certain delightful walk which he took on a given day, or a particular orange which was specially good.

Now with simple retentiveness, which is the basis of all memory, the teacher can do little or nothing. It is a fact which he must accept. It varies from one individual to another, and in the same individual at different times. It depends on the state and quality of the nervous tissue. Health probably affects it. But that is not the teacher's chief concern, though it should certainly obtain much consideration from him. Probably retentiveness is greater in the morning, when the nerve tissue is fresh, than in the evening, when it is more or less exhausted. This, too, should be allowed for by the teacher. But given a certain state of health, a particular time of day, and all the available attention of the class, the teacher cannot do anything to improve the retentiveness of his pupils. That will always act in a fixed way.

This, however, does not mean that the teacher cannot improve the memory of his pupils *for certain things*. Given a fixed degree of brute retentiveness much depends

[1] *Psychology for Teachers*, New Edition, p. 60.

on the use made of it. And for this the teacher is largely responsible. The use made of it in school is largely in connection with specific things which are taught, and which have to be definitely remembered. Consequently, though we must never lose sight of the general factor called retentiveness, on which all the rest depends, we as teachers are particularly interested in memory as the power of reviving definite portions of past experience.

In connection with these ordinary cases, which are usually referred to under the name of memory, there are three distinct phases—(1) a certain experience, (2) an interval during which the experience is no longer thought of, (3) a more or less complete revival of the original kind of experience, or of some element of it, or of some modified form of it.

This is what can be gleaned from the mental side. From this point of view, the interval between the experience and its revival contains nothing connected with the experience. It is filled with other mental states or experiences. Those psychologists who have tried to treat of mental states without reference to nervous processes, and who have endeavoured to get a certain completeness in the mental world independent of the physiological processes of the nervous system, have found a great difficulty in connection with this intermediate period. They have usually recognised that if the experience can be revived, in whole or in part, it must have left some traces. And they have tried to find some *mental* traces. Introspection, however, can discover few—in many cases, none at all. These psychologists, therefore, have often been led to suppose a sub-conscious region into which our experiences sink, and in which they continue to live an attenuated existence until the time when they are recalled to more complete life. Now while some of our experiences do continue to reverberate for some time in a sub-conscious way, it is difficult to believe that they sink a little lower and continue permanently. It is still more difficult to believe that *all* our multitudinous experiences also continue in this way.

The best explanation which can be given of the fact of

retentiveness is by reference to the nervous system. Those parts of the brain which are excited during a given experience are permanently altered. They retain, then, some traces of the excitation. These traces tend to fade. But if, before they have disappeared, nervous impulses run to the same part of the brain, a re-excitation occurs which is more or less similar to the original one, and which is consequently accompanied by a more or less similar mental state.

In retention, then, it may be said the brain plays a rôle somewhat like that of the wax record of a phonograph. When certain sounds are produced, the wax which is in rotation receives certain impressions. The record may be put away for a period, and then replaced upon the cylinder of the phonograph and caused to rotate as it did on the original occasion. Similar sounds are reproduced. In this analogy the sounds stand for mental processes, the rotation of the cylinder on the second occasion stands for a re-excitation of the same brain cells. The analogy, of course, must not be carried too far. For instance, if the record is carefully preserved, it can reproduce the sounds as clearly as ever, even after a long interval. But the traces left in the brain are continually fading.

The important thing for the teacher is to know how it is that re-excitation takes place. We have already seen, in dealing with after-images, that nervous excitations tend to persist a little time after the conditions giving rise to them have ceased. Neurones which are in a state of activity seem to be able to drain energy from other cells, and to monopolise it for a time. Further, the paths so established seem to become more pervious, so that energy tends on future occasions to find its way along the same tracts to the same cells. When, therefore, neurones have been very intensely excited, there is a tendency, not only for the excitation to continue a few moments afterwards, but for the energy of many other portions of the brain to be drafted to them, and to set them in excitation again.

Thus any very striking experience appears to recur many times spontaneously. If a tune has "caught on" with us, we find it continually springing up in our minds.

If we have seen a man run over, the terrible experience tends to be revived in imagery again and again. This tendency is known as *perseveration.* It may be considered to exist in all cases. In other words, it is the same kind of thing as *retentiveness.* But it is sufficiently strong to produce spontaneous revival only in the case of very vivid and intense experiences, and especially during the time immediately following them. And it is, consequently, only in such cases that the word *perseveration* is usually employed. We shall, however, use the term in its widest application in what follows.

But we get revivals of many things which were not exceedingly striking on their original occurrence. Perseveration is the chief factor only in the revival of a few very striking things. The great majority of our revivals are due also to the fact that experiences which occur together become connected together in our minds by the act of attention, so that when one occurs again, either as actual experience, or itself as a revival, it tends to revive the others. This connection is usually referred to as *association.* We have already noted the neural basis of this in dealing with the complication of sensations by the traces of previous sensations. When two sets of cells are excited together, or in close succession, paths are rendered pervious between them, so that if one centre is excited again, the other is likely to be excited also, though usually not with such great intensity or completeness.

There is doubtless a close connection between perseveration and association. They are probably two parts of one comprehensive process. Every case of revival is due both to perseveration and to association. The difference between the various cases is that in some perseveration seems to be the chief reason for revival, in others association. But even the most striking cases of spontaneous revival probably depend on a system of nervous paths having been made pervious. As Professor Carveth Read says, "we must also admit that ideas may be aroused as the effects of remote stimuli of whose operation we have no present consciousness, and, therefore, we need not regard spontaneous ideas as exceptions to the principle of

association."[1] The great excitation which must have occurred in the first place has drained energy from various sources, creating *many* paths whereby re-excitation of the original part is likely to take place. For during waking life all the neurones of the brain are partially charged with free energy, and some of this can be drained from them under exceptional circumstances. In cases where association seems to be the only factor leading to revival, we may suppose that the experience revived was on its original occurrence not sufficiently intense to involve a great excitation, draining energy from many surrounding parts. If it had occurred—with the same intensity—*in comparative isolation*, it would have succeeded in draining little if any nervous energy from other parts. No paths would have been formed. And it could never be repeated, except by a repetition of the same external conditions.

Thus I am told the name of a person, but fail to recall it even when I see the person again shortly afterwards. I am able to get the name again only by being told it again. But if I had attended to the person and to the name, either together or in close succession—to the name, for instance, immediately after the person—there would be much more chance of my recalling the name on seeing the person, *even although the amount of attention both to the person and to the name is no more in this case than it was in the former*. I may not have attended sufficiently to the name to cause any great drainage of energy from other parts of the brain, more or less imperfectly connected with the centres involved in cognising the name, but one of those other parts (that concerned with cognising the person) had just been excited, and its excitation (involving attention) was only just dying down when the new excitation (that concerned with cognising the name) began. Energy is therefore drained from the excited centre which is just dying down to that which is beginning to be excited. The conscious aspect of this is the passage of attention from one thing (the person) to the other (the name).

[1] Article on "Relations in Thought," *British Journal of Psychology*, Vol. IV., p. 353.

We see, then, that if a centre cannot be so intensely excited as to drain many paths for itself, it will stand a chance of being re-excited from within the brain only if it has been able to drain one or more centres which are already in dying excitation at the time of its own excitation. That is to say, in normal cases a definite path must be constructed by the passage of attention from one thing to another. If, later, the centre first excited is re-excited, either from without or from within, energy flows more or less readily along the path already made, causing re-excitation of the other centre. The latter attracts to itself the discharge from the former. The mental state accompanying the excitation of the first centre seems to call up the mental state accompanying that of the second. We may speak of the matter in this way so long as we understand that the real explanation must be sought in the nervous processes.

Sometimes we get a combination of the two extreme cases described, *i.e.* a thing which is liable to be revived fairly frequently on account chiefly of perseveration, and also, at other times, on account chiefly of definite associations which have been formed, is revived all the more frequently and readily by the combined action of both. Thus, if I have made a striking mistake in dealing with a person named Jones, I may find myself from time to time worried by the spontaneous remembrance of my foolishness. But if the name Jones happens to come under my notice frequently, I am likely to have still more reminders of my folly.

The process of association with which we have been dealing is sometimes called *association by contiguity*. One thing (present) suggests another (absent) because the two have been contiguous in past experience, and have therefore been associated. Some psychologists speak of other kinds of association—especially of *association by similarity*. But on close examination we find that all cases depend ultimately on contiguity. All suggestion of things not present is due to a process of *redintegration*; things found or put together in past experience tend to call one another up.

Let us take an example of *association by similarity.* The sight of a man with a bald head and a long white beard leads me to think of my grandfather. *But I have never seen the two men together, or, indeed, thought of them together.* My grandfather died many years ago, and this is the first time I have seen this other old man. The supporters of association by similarity as a distinct kind of association maintain, therefore, that in such cases there must be another and totally different kind of link—the link of similarity.

But, looking more closely into such a case, we find that there is still redintegration based on links of contiguity. The bald head and long white beard stir in me the same "feelings" which I had formerly when I looked on my grandfather. But these "feelings" *were connected with other attributes of my grandfather.* These other attributes are now aroused to complete the old picture, and I find myself thinking of my grandfather instead of the present old man.

But this other old man is still present, and coming back to him I recognise that he is the cause of my thinking of my grandfather. I may go on to say: "That old man is very much like my grandfather," and I may enumerate the points of likeness between them. It seems to me now that similarity is the only link.

Let us consider for a moment a case recognised by all psychologists as due to association by contiguity. The ringing of a bell at the seaside makes me think of my school in the busy town. This is obviously because the two kinds of experience have occurred together in the past. But this bell that I now hear is not the *same* bell that I heard formerly. It is *similar* to that bell. We see, then, that even the suggestion recognised by all as due to association by contiguity is dependent also on similarity. There must be similarity between the present object and an old one with which the thing suggested has been associated. So great is the similarity, indeed, that we often consider the present object as identical with the old one.

We see, therefore, that not only do the cases cited as distinct instances of "association by similarity" rest also

upon contiguity, but that the very thing (similarity) which is supposed to distinguish them from instances of association by contiguity is necessary also to the latter. As Lloyd Morgan says, "I think it may be said that *all* association is by contiguity, and that *all* suggestion is by similars, for we never have the same presentation twice, though it may on the second occasion be another presentation from what we call the same source."[1]

Expressing the matter schematically, we may say that whenever *A* (present to the mind) suggests *B*, similarity and contiguity are both involved. In the case of the bell calling up school, there is similarity between this bell and another bell which was contiguous in past experience to school. Here the similarity is so complete that it is ignored, and the example is labelled *contiguity*. In the case of the old man calling up my grandfather, there is similarity between certain parts of this old man (bald head and long beard) and certain parts of my grandfather, and there is obvious contiguity between these parts or qualities of my grandfather and the rest of him. Here the contiguity is generally ignored, and the example is labelled *similarity*.

Or we may express the matter diagrammatically. Let the triangles *A* and *B* represent the thing suggesting and

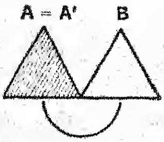


Fig. 17.
(A' is a former case of A which has occurred with B.)

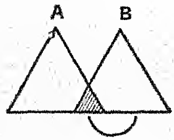


Fig. 18.

the thing suggested respectively, let the shaded portions indicate similarity (which is for all practical purposes identity), and let the parts connected by the semi-circles represent the parts associated by contiguity. Then Fig. 17

[1] *Psychology for Teachers*, p. 80.

represents the cases usually labelled "contiguity," and Fig. 18 those usually cited under "similarity."

It should be noted that in cases of the latter type ("similarity"), when once *B* has been suggested by *A*, there is usually an oscillation of attention between the two as wholes. In other words, these cases often become cases also of the former ("contiguity") type. When the old man has suggested my grandfather (by "similarity"), my attention may now pass from one to the other and they are now also connected by "contiguity," *i.e.* in the same way as they would be associated if I merely saw the two men together, or thought of them together, without any possibility whatever of noticing likeness between them.

We see, then, that there is after all some justification in distinguishing the two types. In "contiguity" cases, the similarity is so great that it can take care of itself, but the contiguity in the mind must have been definitely established by previous associations. In "similarity" cases, the important thing is whether the points of similarity will stand out or not: and it is contiguity that can here take care of itself, for it is not a more or less artificial association of two elements, but the close connection of parts in one whole.

These latter cases involve some analysis of the suggesting thing. They require more *intelligence*, whereas the others depend more on mere *memory*, *i.e.* on association. This is strikingly shown as development proceeds. "As the mental life grows richer and more complex, more subtle relationships are disclosed in a more decisively intellectual comparison. In the early stages of experience suggestion by similars is dependent upon mere superficial resemblance. In later stages there is a suggestion by similarity in more deep-seated characters." [1]

Having now recognised the distinction between these two types, we must again insist that they are not different types of *association*. There is only one kind of *association*—by *contiguity*. And similarity is necessary in *all* cases in order that the links formed by contiguity may be utilised

[1] Lloyd Morgan, *op. cit.*, p. 82.

for recall. Some cases of suggestion, indeed, may be explained as instances of either type, according as we emphasise similarity or contiguity.[1] Thus the bell reminding me of school has already been explained as a case of "contiguity." But it may equally well be brought under "similarity." Suppose that I am eating my breakfast when the bell starts ringing, and suppose also that I live near the school in town, so that I have often been in a similar situation in the morning. I may say that the present situation recalls the past because of the similarity between them.

All those parts of school work which are concerned with memory depend to a large extent on the processes which we have sketched. The teacher wishes the pupils to remember a great many things. He wishes them to be able to revive many of the facts and, in some cases, the forms of words which have been told to them. He must concern himself therefore with two conditions—(1) with making impressions as striking as possible, and (2) with getting the things connected together by passages of attention from one to another. These two conditions are not entirely independent of each other. A striking impression is one which secures and holds a large share of attention, and if one striking impression succeeds or accompanies another, there is likely to be a passage of attention from one to the other. The whole problem, then, of ensuring a good memory is largely one of securing certain directions of the attention. That, at any rate, is all that the teacher can do. The rest must be left to the nervous system of the child. This, of course, varies from child to child. Our labours produce good fruit on some soils, and indifferent results on others.

With respect to the first of the two conditions, it is obvious that most of the impressions of school are not sufficiently striking to ensure spontaneous revival. But do we want this? Do we not rather want the boy to be able to revive certain things *when required*? Now when they are required, there is usually something present which

[1] Usually one or the other *is* the more prominent. But we do not always know which it is.

has formerly been connected with them. We shall find, indeed, that most of our knowledge consists of elements connected together in such a way that one single part is of no use without the other, and that the need for one part does not arise unless some other part is already given. Thus the knowledge that $4 \times 7 = 28$ involves a number of elements connected together. There is no advantage in the whole of this or a part of it occurring spontaneously. It is only of value in cases where a part is already given and the rest is required. Thus I may want to know the factors of 28, or the product of 4×7, or the number of times 7 is contained in 28. Even an examination question consists of certain things which are given. Something must be stated in the question. And the examinee is asked to produce certain things which should be associated in his mind with this.

Memory work is largely an affair of forming associations between things. Still, as already noted, this is not unconnected with the stamping in of the separate things: perseveration and association work together. Thus, if I attend to A and then pass swiftly to B before A has left my mind, the connection or association will be stronger when A and B each makes a vivid impression than when they make only feeble impressions. We may even speak of the perseveration of the association, and say that it is strong when the terms connected are strongly impressed, provided of course that they *are* connected by an act of attention. If they are strongly impressed *in isolation* one from the other, the association will not be made.

Now the impressiveness of an experience does not merely depend on the intensity of the stimulus, but also on the way in which the mind receives it. For instance, the figures attached to the names of various first-class batsmen to indicate their aggregate runs for the season are little different from the figures attached to the names of the Kings of England to indicate the years in which they commenced to reign. But the former may make a lasting impression on a boy's mind, while the latter may fail to create any appreciable effect. The teacher cannot always ensure that what he presents is received with avidity.

He can, however, do much by the way he presents it and the circumstances which he arranges. He can often do much to create an interest in the things which he desires the boys to learn. Still, he can seldom arrange matters so well that *one* presentation of two or more things will lead to a firm association. There must be sufficient repetition to fix the association firmly in the mind. Repetition makes up for lack of impressiveness, and it is needless to add that it has to be frequently resorted to, especially in cases in which a large number of associations are involved, as in learning a table or a piece of poetry.

Since repetition is a necessary evil, it behoves the teacher to consider the most efficient form of it, *i.e.* the way of arranging the learning which gives the best results with the least number of repetitions. Many experiments have been performed with a view to determine the best method of attacking a series of presentations which it is desired to revive in the same order. It is impossible to give details here of the experiments themselves. We can only take note of their results.

In dealing with such matters as a piece of poetry which is of moderate length and which is fairly well understood, so that it presents no special difficulties, it is better to repeat the whole from beginning to end rather than to learn a portion at a time. When small parts are learned by separate efforts, it becomes very difficult to knit them together in the right order.

But if the matter to be attacked is unfamiliar, or very long, or if it presents many internal difficulties, it is best to attack it in portions. We have to master these portions first, and then attempt to string them together in the right order.

It is better to spread repetitions over many days than to concentrate them all on one day, or even on several days. Thus, three days with eight repetitions each would produce a better effect than twenty-four repetitions on one day. Six days with four repetitions on each would be better still. And two repetitions on each of twelve successive days would be best of all. Of course we cannot always arrange school work to suit all requirements. The diffi-

culties of framing time-tables are already very great. Still, much can be done by enthusiastic teachers. Thus, if two hours a week can be given to a subject like French, which involves much memory work, it would be better to arrange for four half-hours on four separate days than for two hour-lessons on two different days. Often, too, it is possible to have several pieces of memory work in hand at the same time, instead of requiring the thorough mastery of one before going on to another. "Suppose three pieces of verse or chapters of facts are to be learned. Let the plan of work be as follows :—

First Day... ...	2 or 3	repetitions	of 1st	piece
Followed by	2 ,, 3	,,	,, 2nd	,,
,,	2 ,, 3	,,	,, 3rd	,,
Second Day ...	2 ,, 3	,,	,, 2nd	,,
Followed by	2 ,, 3	,,	,, 3rd	,,
,,	2 ,, 3	,,	,, 1st	,,
Third Day ...	2 ,, 3	,,	,, 3rd	,,
Followed by	2 ,, 3	,,	,, 1st	,,
,,	2 ,, 3	,,	,, 2nd	,,

and so on, till they are acquired. Such or similar procedure is suitable for any kind of memory work, whether it be verses, spelling, geography, dates, or any other mainly associative groups of facts. With this plan of work, however, one must remember that it is not good to try to recall between days. Nor, if teaching by distributed repetitions, should pupils be tested until one feels sure that the most of them will recall correctly. Then those with better memory should be tested first. Their correct answers will serve as extra repetitions for those whose memories are less nimble and tenacious."[1]

It is, then, bad to begin testing too early, before the associations are fairly well fixed. For, if a mistake is made, it is not merely a failure, *it involves the fixing of a wrong association*, which may require much labour to eradicate. We should try to keep everything right, *especially in the early stages*, when the groundwork is

[1] H. J. Watt, *The Economy and Training of Memory*, pp. 59, 60.

being laid. The early impressions seem to produce the most lasting effects. The first repetition, for instance, contributes more towards the formation of associations than any succeeding single repetition. It is extremely important, therefore, that no mistakes should occur at the beginning.

This caution is not, however, sufficiently observed by teachers. In teaching spelling, for instance, many teachers set dictation in which a large number of children make mistakes. Now *tests* in dictation *must* be given from time to time. The headmaster must know what the class is capable of. And he sets a test to "extend" even the most advanced. It necessarily follows that the less advanced make mistakes. But this necessary evil should occur only two or three times throughout the year. Dictation as an *exercise*, as a means of fixing spelling, should not involve mistakes. When it does, it leads to the *further fixing of wrong associations between letters.* Even though the right ones are given later, and repeated again and again, the early errors leave their traces. And the dull boy may remain confused between the right and the wrong for a long time. The dictation which often occurs several times each week should be considered as a means of further fixing by repetition under new circumstances—the circumstances of *writing*, which are the only ones where correct spelling becomes necessary—*what is already fairly well known.* The stupid teacher might object that, if every boy gets all his dictation right, nothing has been accomplished, since the boys evidently knew all the words beforehand. But he would be forgetting that the spelling of these words has been more firmly fixed. Without such an exercise, many of the duller boys would in a few days forget some of the spellings with which, it is true, they are tolerably familiar before the dictation takes place.

Another caution, very intimately connected with the preceding, is that the teacher should avoid placarding wrong forms on the blackboard. When a mistake is discovered, let the right form be substituted and impressed as swiftly as possible.

When a fair amount of repetition has been done, there

should be a pause. Any mental activity supervening is injurious to the associations which have already been partially or wholly formed. It is hardly necessary to add that work done when the mind is fresh leaves more lasting effects than that which is done in a state of fatigue. The morning is in most cases the best time for memorising.

It is well known that poetry is usually easier to learn than prose. The chief help here, besides such minor aids as those of alliteration and rhyme, is *rhythm*. Work of *all* kinds proceeds more effectively when some rhythm can be introduced into it. And where the object is merely that of memorising, the teacher should encourage the children to fall into a "swing."

The principle of association whose applications we have been considering is often referred to as the *association of ideas*. It is obvious that the word *ideas* is here used in a very wide sense. For such things as mere sounds can be associated without any meaning being attached to them. A great many of the experiments on memory to which reference has been made were performed with nonsense syllables, *i.e.* with syllables artificially constructed with the idea of avoiding any help from previous knowledge. Syllables like *moj*, *pam*, *kep*, *gid*, are examples of such material.

It is obvious, however, that associations can also be forged between veritable ideas or concepts. We have already given an example. The combination $4 \times 7 = 28$ involves, besides the mere words or sounds corresponding to the figures, several ideas which may be linked together by repetition. The ideas in this case are of number. But other ideas can also be associated. Thus I may hear, understand, and try to remember the statement: *A tall black man was sitting on an old wooden seat.* It would of course be possible to associate these words together as mere sounds. A foreigner who does not understand English might repeat them until he is able to recall them in the proper order. It is probable that little children often repeat words in this way. Thus the young child who was found to be saying "Surely *good Mrs.*

Murphy shall follow me all the days of my life" could hardly have had any satisfactory ideas corresponding to the sentence.

It is to be feared that many children in the past began such things as multiplication tables in similar fashion. Some teachers rarely made any effort—by demonstration with actual objects—to ensure that the children really grasped the ideas corresponding to the words. They made the common mistake of assuming that the words necessarily carry their meaning with them. And they were annoyed at what they chose to call the "stupidity" of the children. The latter were slow in learning the comparatively meaningless jumble of sounds, and still less apt at using the table thus acquired.

When both the words and their meanings or ideas are attended to in repetition, we have two series of associations intimately connected. And it is obvious that each forms a support to the other. Not only the bare meanings but images of the things specified are likely to arise. These may also be of help.

But the meanings or ideas are of such a nature that, where they make "sense," they are not in all cases mere juxtaposed elements. To a greater or less extent each implies or points to other ideas. And some of these implications exist in almost every sentence. Thus in the sentence cited above, there is no necessary connection between *tall*, *black*, and *man*, or between *old*, *wooden*, and *seat*. We might equally well have spoken of a *short*, *fair* man, and of a *new*, *iron* seat. But there *is* some of this ideational connection between *sitting*, *on* and *seat*, and there is a little, though perhaps much less, between *man* and *sitting*. *Sitting* at any rate implies some living being performing the action. Many ideas, then, refer to qualities or relations abstracted from the concrete. And these qualities or relations point to other qualities or relations or things. When, therefore, we have some ideas, others are more or less definitely implied by them.

Now when the matter to be learned is replete with ideas which imply one another, we have a set of connections of a different kind from those due to mere proximity. The

kind of connection we have previously studied was association by mere *contiguity*. But this further kind of connection consists of *thought-links*.[1] There are always many of these links present, both in prose and poetry. And the work of learning is immensely aided thereby. The reader has only to rearrange the words of a piece of prose or poetry into a meaningless series to realise what a gigantic task it would be if the connections could only be forged through the simple form of association by contiguity, as we have described it.

All intelligent teachers appreciate the need of thought-links They realise that their pupils will learn a piece by heart with much more readiness when they thoroughly understand it. As Professor James says, "by making the pupil skilful in the best method, the teacher can both interest him and abridge the task. The best method is of course not to 'hammer in' the sentences, by mere reiteration, but to analyse them, and think."[2]

To return now to the principle of association, it should be noted that there is not only association of *ideas*, even if we take that word in the widest possible sense, but of all kinds of processes. What we call *habit* is based upon the same principle. All nervous processes, whether involving thought or movement, which occur together or in close succession, tend to become linked together by the formation of more and more pervious paths. And the avoidance of wrong associations, especially in the early

[1] Thought-links may be regarded as fixed and fundamental forms of association, as connections which have been indelibly established by reason of the fact that they correspond to the uniformities of nature. Such thought-links need not by any means have been forged during the life of the individual. They have probably been formed in great measure during the long course of evolution, the corresponding cerebral development having been inherited. "Those who contend that knowledge results wholly from the experiences of the individual, ignoring as they do the mental evolution which accompanies the autogenous development of the nervous system, fall into an error as great as if they were to ascribe all bodily growth and structure to exercise, forgetting the innate tendency to assume the adult form" (Spencer, *Principles of Psychology*, § 207).

[2] James, *Talks to Teachers on Psychology*, p. 132.

stages, is just as important in the realm of habit as in the realm of association of ideas. Hence the importance of the recommendation, "Never lose a battle." For this means the impressing of a wrong association. By securing that a given series of actions is uniformly performed in a given situation, we are developing nervous paths which are likely to function long after we have given up control of the child. In securing this uniformity of action under given circumstances, we have often to make use of punishment and reward; by punishing the child for undesirable actions and rewarding him when he acts as we wish, we endeavour to make right-doing habitual.

But, it may be pointed out, there are many cases in which children, after being forced by teachers and parents to acquire a number of good habits, have broken out into evil courses when no longer under control. This is a most important objection. It is quite true that a habit once formed does involve a tendency to do certain things under certain conditions, and it will always act so long as there is nothing to oppose it. In some cases, where the habit has been deeply ingrained, it is an almost irrepressible tendency. Witness the case of the old soldier who, at the word "Attention!" uttered in the usual military fashion, dropped his hands to his sides and lost the dinner he was carrying. But few habits are so firmly fixed. And there are other tendencies which may act against them. We have a number of instinctive and innate tendencies. These develop and come to maturity at various times in our lives, and together they constitute a system of forces which are usually far more powerful than those which owe their strength merely to repetition of a given series of actions during a certain limited period.

Are we, then, to become hopeless with respect to the utility of forming habits? Certainly not! *Mere* habits may be weak. But few of our habits need be the result of mere repetition. We can build many habits upon the basis of the instinctive and innate tendencies. And we can often select tendencies which will operate in maintaining the desired habits long after our direct control is removed. A boy may be forced to be regular and

punctual by fear of punishment. We are here appealing to a natural tendency of the child. But will it work in support of the habit when punishment is no longer certain to supervene? If, however, we can induce the boy to be regular and punctual by invoking his love of approbation, his tendency to self-display, his desire to distinguish himself and make a good reputation, these tendencies are likely to work in supporting the habit when he is no longer under school regulations. A large part of our business as teachers or parents consists in noting what instinctive tendencies are strong, and when they are strongest, and in directing these tendencies into channels of action which we desire to see established, and which will soon become habits. They will not be *mere* habits, however, but will be grafted on powerful tendencies, which will support them in the hour of trial.

We see, then, that these instinctive tendencies bear somewhat the same relation to mere habits as thought-links bear to associations of ideas by mere contiguity. By them the connections forged by repetition alone are strengthened to an immeasurable extent.

"In the formation of good habits, therefore, two methods are possible; both are used to a certain extent by everyone who is responsible for children. In the one case we make use of the child's capacity for pleasure and pain; by punishing the bad actions and rewarding the good, we gradually make right-doing habitual. In the other case, we make use of the child's natural impulses in the right direction; by associating these with the right actions, we gradually form desirable habits. Our judgment tells us that, whenever possible, the latter is the better course to pursue, though, in particular instances, we may occasionally have to fall back on the former method."[1]

The reader should now see clearly that associations of ideas and habits are formed by similar means. The former, indeed, might be called *habits of thought*. As Professor Pillsbury puts it, "All recall is dependent upon the connection of ideas, and ideas are connected only

[1] Mumford, *The Dawn of Character*, p. 57.

as the neurones are united through the reduced resistance of the synapses. The association processes are thus in every particular similar to habits. They might be called habits of neurones in the cortex. The only difference worth emphasising is that in this case there is no movement of muscles accompanying the activity of the cortical cells. Even this difference is not always present, for the cortical cells whenever active tend to call out movements, often very slight, sometimes nothing more than the tendency to movement."[1]

Professor Pillsbury sums up the whole matter very well as follows: "As the outcome of our discussion, we have a picture of the nervous system as a mass of relatively independent amœba-like cells that are held in a definite position and relation to one another by a cage of bone. At the beginning certain of the neurones constitute a path for an impulse from sense-organs to muscles. These original paths are few and make possible only the most essential activities for the continuance of the life of the individual. Additional paths of connection are formed by each activity, physical and mental. Whenever any two neurones chance to act together a connection is formed between them, the original gap is bridged, and they come to form part of a new pathway from sense-organ to muscle. Sometimes the most important of the neurones that are connected lie within the cortex, and the learning that results is primarily learning of ideas rather than of movements, but the principle is the same as before. Learning, whether of new movements or of new ideas, is a process of making easier the passage of an impulse from neurone to neurone and is fundamentally the same everywhere."[2]

It *may* be that even the "original paths," both those of thought and those of action, are ultimately due to connections slowly formed during the long course of racial evolution, and handed down by inheritance. In other words, both the indissoluble thought-links and the instinctive tendencies have been regarded as inherited

[1] Pillsbury, *Essentials of Psychology*, pp. 58, 59.
[2] *Op. cit.*, p. 52.

associations by some thinkers. Herbert Spencer was one of these, and wrote as follows:—

"In brief the case stands thus: It is agreed that all psychical relations, save the absolutely indissoluble, are determined by experiences. Their various strengths are admitted, other things equal, to be proportionate to the multiplication of experiences. It is an unavoidable corollary that an infinity of experiences will produce a psychical relation that is indissoluble. Though such infinity of experiences cannot be received by a single individual, yet it may be received by the succession of individuals forming a race. And if there is a transmission of induced tendencies in the nervous system, it is inferrible that all psychical relations whatever, from the necessary to the fortuitous, result from the experiences of the corresponding external relations; and are so brought into harmony with them.

"Thus, the experience-hypothesis furnishes an adequate solution. The genesis of instinct, the development of memory and reason out of it, and the consolidation of rational actions and inferences into instinctive ones, are alike explicable on the single principle that the cohesion between psychical states is proportionate to the frequency with which the relation between the answering external phenomena has been repeated in experience."[1]

To conclude this discussion, it may be added that these "original paths" which Spencer thus attempts to explain are probably not so "few" as Pillsbury leads us to suppose in the passage quoted above. They can only be called "few" if we consider the child *at birth*, and neglect to take into consideration the fact that the brain grows and develops to a large extent automatically, and independently of any specific kind of experience. "But, as the case stands, the gradually increasing intelligence displayed throughout childhood and youth is more attributable to the completion of the cerebral organisation than to the individual experiences—a truth proved by the fact that in adult life there is sometimes displayed a high endowment

[1] Spencer, *Principles of Psychology*, Chap. on "Reason," § 207.

of some faculty which, during education, was never brought into play. Doubtless, experiences received by the individual furnish the concrete materials for all thought. Doubtless, the organised and semi-organised arrangements existing among the cerebral nerves can give no knowledge until there has been a presentation of the external relations to which they correspond. And doubtless the child's daily observations and reasonings aid the formation of those involved nervous connections that are in process of spontaneous evolution; just as its daily gambols aid the development of its limbs. But saying this is quite a different thing from saying that its intelligence is wholly *produced* by its experiences. This is an utterly inadmissible doctrine—a doctrine which makes the presence of a brain meaningless—a doctrine which makes idiotcy unaccountable."[1]

In former times there was much talk about "training the memory." The memory was looked upon as a kind of mental organ playing a part similar to that of the arm or leg in the case of the body, and it was thought possible to make it *generally* stronger by *any* kind of exercise. One of the reasons often given for learning poetry was that it strengthened the memory, so that other things, like dates in history or facts in geography, could be memorised more readily.

Experiments have been performed in schools to test this contention, and it has been found that there is no definite transfer of power in the way claimed. And this is in harmony with our description of the processes involved. Memory is founded on associations and thought-links between certain definite "ideas." These are formed more readily and permanently by one individual than by another, and even by the same individual at certain times rather than at others. But this is due to greater interest, to the use of associations and thought-links already formed, and to inherent superior capacity. None of these reasons involves the improvement of a separate entity which we

[1] Spencer, *Principles of Psychology*, Chap. on "Reason," § 207.

can call "the faculty of memory." Greater interest involves greater attention, so that the ideas and their connections are more deeply impressed. If ideas already linked by associations and by thought occur in the new material studied, it is clear that the improvement due to them must not be put down to a strengthened "faculty." And the inherent superior capacity to which reference has been made is probably due as the state of the nervous tissue. This is largely a question of health and constitution, and cannot be improved by exercise, except in so far as this affects health and general constitution.

Apart, then, from those conditions which are admitted by *everyone* to affect memory (general health, time of day, interest in the subject studied) it is only in so far as the same materials or processes are involved in the new material that improvement is likely to show itself. The learning of poetry, therefore, does not help the learning of dates. But in many cases there are *some* common elements. Thought-links especially are common to many varieties of material. Consequently, we often find some improvement. We no longer, however, learn poetry to improve *the* memory, but for the sake of the poetry itself.

Similar remarks apply in the formation of habits. For these, as we have seen, are associations. A habit formed in connection with certain definite material is not likely to transfer itself automatically to other material.

"At the Montaña State Normal College careful experiments were undertaken to determine whether the habit of producing neat papers in arithmetic will function with reference to neat written work in other studies; the tests were confined to the intermediate grades. The results are almost startling in their failure to show the slightest improvement in language and spelling papers, although the improvement in the arithmetic papers was noticeable from the very first."[1]

And similar remarks apply all round. For all the higher mental processes involve associations and thought-links. What has been called the disciplinary value of

[1] W. C. Bagley, *The Educative Process*, p. 208.

studies and occupations has, therefore, been greatly exaggerated. This idea that certain studies effect an improvement all round is sometimes called the *Doctrine of Formal Training* It is still largely adhered to in many spheres of education. In some secondary institutions, for instance, Latin and Greek are the chief subjects taught. And this, not because they are an aid to the study of English, but because they are supposed to be the only means of developing a mind able to deal with great things (*e.g.* with high administrative work). Now it is true that a thorough study of classical literature gives much insight into the nature of language, of the thoughts expressed by that language, and of the human beings whose doings are chronicled therein. And such insight is necessary for statesmen. But it is not true that special "faculties" are developed in connection with a classical education. Nor is it true that the insight necessary for managing public affairs is only to be obtained in connection with the classics.

This fallacy has appeared in many forms. We may refer to one more. Grammar used to be taught largely in elementary schools for the reason that "it tends to *foster clearness and precision of thought.*" Now, according to the views just expressed, it fosters clearness and precision of thought *in grammar*, but not in other subjects, except in so far as they involve the same ideas. Thus arithmetic involves very few of the same ideas, and is very little helped by grammar. But composition involves a good many. To write correctly at all times, one must have some idea of subject and predicate, of case, of the accord of verbs with their subjects, and so on. But many of the details of grammar, such as are required for complete *parsing*, are not necessary for correct composition. On the other hand, if one is going on to the study of other languages, many of these further details will be necessary. We still teach some grammar, therefore, but for its *utility* rather than for its disciplinary power.

"The one thing of which a teacher can be sure is the particular information, the particular habits and powers, the particular interests and ideals which his training gives

directly; he may fairly expect improvement, but less in amount, in abilities closely like that trained; he may hope for some in more remote abilities, but for less and less and finally for none as the ability has less and less kinship with the one directly trained."[1]

But although we have condemned the Doctrine of Formal Training when carried to excess, it must be remembered that there is still considerable truth in it. Some subjects provide a training which should have its effects on the whole of life. We do not place Scripture or Moral Instruction on the Time Table because of the direct utility of these "subjects" in any limited sphere. We hope that they will have a broad general influence on the lives of our pupils. How is this possible? We have already caught a glimpse of the way in noting how thought-links and conative tendencies are the great supports of mere associations and mere habits respectively.

Now thought and conation are not to be considered as completely separate. We have seen that whenever they occur they are aspects or elements of one single mental state or process. Though in the more rudimentary stages of life conation may be present with little cognition, in the more highly developed forms we can never have one without the other. Thus in the early stages of human life and throughout the whole of the lives of the lower animals, conations arise and run their course with little thought accompanying them. But in the case of the human being development proceeds apace. The sporadic conations of early life are gradually modified and directed to definite *ends*, which the individual foresees, *i.e.* of which he has ideas. Further, there is often a long chain of means of which he is conscious beforehand through the agency of other ideas. Animals, for the most part, drive on blindly to ends of which *they* have no definite ideas. In man, conation becomes more and more illumined and directed by intelligence. There gradually grows up a more or less clear consciousness of the meaning of the

[1] Thorndike, *The Principles of Teaching*, p. 242.

whole business of life. We not only push forward, but we know to some extent whither we are tending. In other words, we gradually develop what are variously termed, though with somewhat differing meanings, *ideals, sentiments,* or *purposes.* Looked at from the conative side, these are tendencies or impulses (often very multifarious and complex, and accompanied by other experiences which we shall study later, but which we may sum up for the present under the term *emotional* elements). Looked at from the cognitive side, they are merely ideas of the ends towards which we are tending. They are lights to make clear the path for the other and more important factor—conation.

"This factor may be illustrated by reference to any great achievement. Peary's conquest of the Pole, for example, represents a large unit of human experience which, because of its very 'bulk,' so to say, and because of the unity of purpose which bound together all of its elements, serves admirably the purposes of psychological study. Obviously the prime controlling force in Peary's achievement was the purpose that dominated it. It is not sufficient to describe this purpose simply by saying that it was the *idea* of reaching the Pole. Thousands of men might have that idea. In Peary, however, the idea of reaching the Pole was infused with a powerful emotional force which made the idea directive over his conduct during the long series of efforts and trials and interpolated experiences. The idea of reaching the Pole came to be for Peary an *ideal.*" [1]

We try, therefore, to awaken in the child certain tendencies; and these, when made definite by clear ideas of their ends, become *purposes.* If we can awaken *purpose* in the mind of the child, *i.e.* if we can not only arouse the ideas of certain ends, but strong conation towards them, we have a basis on which both habits and intellectual pursuits can thrive. "To see to it that the ideals which accumulated human experience has shown to be worthy, and to make for social welfare are safely and effectively

[1] Bagley, *Educational Values*, p. 57.

transmitted from generation to generation is obviously a prime task of education."[1] These ideals are embodied in literature, in the fine arts, in music, in the forms of religion, government and other human institutions. And we may continue to speak of Formal Training in connection with the study of such things, so long as we clearly recognise its limitations. We may, for instance, oppose the old notion that the classics are the great means of mental discipline by such statements as the following:—

"Reading of the mother tongue learned and always used as a means and not as an end, done effectively and as rapidly as is natural and possible, done so as to serve as an effective discipline, *real* reading, is to increase rather than to diminish in comparative importance among the studies of the school. It will absorb many of the values hitherto set mainly or exclusively upon classical study, and largely displacing the classics will become our most effective means of growth in culture and ideals; just as we pursue the sciences, on the other hand, for information, for control of nature, and for the peculiar discipline which they afford."[2]

With regard to the experiment conducted in connection with the Montana State Normal College, it may, then, be suggested that if the children had been led to take a pride in their school, to consider that *all* its paper-work was an evidence of its excellence, and to resolve to do their best *throughout*, and if *then* the teachers had reminded them of their duty in arithmetic only, we should probably have found some improvement also in the language and spelling papers. It is to be feared, however, that the experiment, as conducted, was only too likely to work against neatness in those other subjects. The teachers, in their anxiety to say nothing on the need of care in the language and spelling papers, would be in danger of leading the children to think that it did not matter. The very attitude of a teacher to his work, even although

[1] Bagley, *op. cit.*, p. 60.
[2] Huey, *The Psychology and Pedagogy of Reading*, pp. 381, 382.

nothing definite is said, will influence the children most markedly.[1]

Further, if excessive care be demanded in one subject only, there may be reaction in the opposite direction in other subjects. Later experiments by Ruediger—one of them in the same Montana School—seem to have confirmed this criticism of the researches of the State Normal College. "Ruediger concludes from these data that neatness made conscious as an ideal or aim in connection with one school subject does function in other school subjects."[2]

Reverting once again to the great law of association, it should be noted that whether we consider its operation in the intellectual sphere or in the sphere of action, whether *i.e.* we consider "the conduct of the understanding" or that conduct which expresses itself in bodily movement, the law of association is merely a description of machinery which can only act when the necessary motor power is applied. This motor power is known as *conation*. Association, whether in the realm of ideas or in that of bodily movement, can only determine the direction of that power. We shall find that some of it is already under direction at the beginning of life, in the form of instinctive or innate tendencies. And during life, some determination of it is due to the influence of pleasure and pain. But the associations formed in the course of experience do much in the way of directing conation permanently into certain channels. It is now our business to consider more carefully this conative force apart from the associations which guide it. We shall consider it both in its relation to pleasure-pain or feeling, and in its ready-made form of instinctive and innate tendencies.

[1] In the *Primer of Teaching Practice* (by Green and Birchenough) are photographs of the writing of a certain boy on two successive days. On the first he had his regular teacher; on the second, a "supply," who, although a good disciplinarian, was not keen on the work. He certainly did not tell the boys that it did not matter. Yet his attitude was enough. The second page is scarcely recognisable as the work of the same boy.

[2] Bagley, *Educational Values*, p. 192.

Questions on Chapter X.

1. Explain what is meant by *perseveration*. To what extent can it be relied upon by itself to ensure reproduction of things learned in school?

2. What do you understand by the *association of ideas*? Show how it works in securing reproduction.

3. Why is it important to secure a *passage* of attention from one idea to another if the two are to be connected?

4. What other links are there between ideas beside those due to association by contiguity? Illustrate the importance of these other links by reference to the learning by heart of a piece of poetry.

5. *Répétez sans cesse.* Is this recommendation to be blindly followed in school? Give reasons for your answer.

6. Why is it important to avoid mistakes in the early repetitions of something which is being learned? Illustrate by reference (*a*) to the teaching of spelling, and (*b*) to the formation of habits.

7. What reason can you give for a habit breaking down, even when it has been fairly firmly fixed by repetition?

8. "Habit is second nature." What proviso is necessary before this statement can be accepted?

9. What do you understand by the *Doctrine of Formal Training*? Criticise it.

CHAPTER XI.

Conation and Feeling.

In outlining mental states considered as cognitions, we have as far as possible endeavoured, for the sake of simplicity, to avoid reference to their other aspects—those of conation and feeling. Our point of view has been similar to that of a man who considers material objects with respect to only one of their qualities. One might, for instance, describe the various things around him with respect only to their shape, neglecting for the time being their colour and their weight. But a complete account of such things would require some reference to these other qualities. So with mental states. We have considered cognition first because it is the most obvious aspect, and the one which has been most fully treated by psychologists. But it must not on that account be considered the most fundamental. Many psychologists maintain that conation deserves this distinction. Cognition, they would say, only arises and develops in the service of conation. We acquire knowledge in, for, and because of, our tendency to push on. All the cognitive states which we have outlined are not mere *states*, but *processes*; they could never exist without that continual reaching forward which we call conation, and their only purpose is to guide conation. Percepts and ideas from this point of view are methods of grappling with a given situation. They involve tendencies to go on with our mental life in certain directions. Or we may say that they consist of various differentiated channels through which conation flows and which it has worn out for itself. Without them, of

course, conation would be a poor thing. It would be nothing but a blind craving. It might be very powerful, but it could achieve little, because of its lack of organisation. It would be like the steam-power which has no delicately constructed machinery to set in motion. To achieve great things in industry we must have both motor power and machinery. One is of no account without the other.

Just as the question of producing motor power is a most important consideration for the manufacturer, so the way in which conation can be aroused is of supreme importance in psychology. We must have conation. As Professor James has said, "A bad reaction is better than no reaction at all."[1] Fortunately, every normal human being is naturally conative. A healthy body is predisposed to activity. We have seen that bodily activity implies activity of the nervous system. The muscles only contract when they are excited by efferent nerves. And the impulses brought by those nerves originate in some nerve centres. These, it is true, are excited by afferent impulses from some part of the body. And so long as we are alive some parts of our body are being stimulated.

But the resulting activity, though due to the stimulations, is not *produced* by them. I might tickle a piece of iron for ever. But it would never respond to my efforts. The foundation of the activity of the living body is a fund of energy stored up in the nervous system, ever ready to be liberated when "touched off" by some stimulus. The impulses produced take varying courses, depending on the structure and organisation of the nervous system. As we have seen, *all* these activities in the nervous system are not accompanied by consciousness. There are many reflexes which take place without even so much as sensation. Where, however, consciousness arises we have mental states which, from the one point of view, that of their distinctive character, are called cognitions; while from another point of view, that of their character of forcefulness, of continuance in a certain direction, they are called *conations*.

[1] *Talks to Teachers on Psychology*, p. 39.

Now the force and direction of the currents vary greatly. We may suppose that every stimulation produces some effect. But since there is only a certain amount of energy available at any given moment, it is clear that many stimulations produce little effect, being, as it were, crowded out by others which secure control of the greater portion of the nervous energy of the moment. This may be expressed in psychological language by saying that one conation tends to *inhibit* others. But how is it that one conation becomes more powerful? Sometimes it is due to the superior intensity of the stimulation. Few students sitting by a window could avoid glancing up from their books and looking out when a military band passes in full swing with drums beating and trumpets blaring. And the teacher would do well to remember that young children are more at the mercy of intense stimuli than older people. It is folly to chide a child for looking away from his lesson when any sudden stimulus breaks in upon him. It is a scolding of the laws of nature.

Now this difference between the child and the adult suggests another reason why one conation is stronger than another. As experience progresses, certain paths get worn out more definitely in the nervous system. In other words, *habits* are formed. Excitations are more easily propagated through the paths thus made than through others. Certain stimuli, therefore, quite apart from their intensity, are specially favoured. They lead to definite excitations which spread to the higher regions of the brain, and are accompanied by mental processes of a very forceful and definite kind. The mother hears the cry of her child when she is deaf to many other sounds which are far more intense. Now the adult has many more of these channels of activity organised in his nervous system than the child. With him, mental processes begin and continue often quite in opposition to the stimuli of the moment. He belongs more to himself, while the child belongs more to its environment.

But even the child has many channels already organised. If he had not, it would be impossible for any definite response to be made at all. The baby on his first entrance

into the world has certain paths innately organised, even in the higher regions of the brain, so that certain stimuli lead to definite cortical processes with corresponding conscious states (very rudimentary it may be) and consequent movements of his body. When the teat is placed in his mouth, he appears to be pleased, and sucks vigorously. If he loses it, or if it is prematurely taken from him, he is displeased, and shows a strong tendency to recover it and go on as before.

Innate tendencies which involve consciousness [including cognition (in the form of perception), feeling, and conation] are usually called *instincts*. The baby begins life with very few. But many others develop as the child grows. These also may be called innate. For they do not depend so much on the experience of the child as on the normal growth and development of his nervous system. They are as much born with the child as his teeth, or the beard which will later on spring out on his chin. Just as a tree develops leaves and flowers, so the nervous system develops various paths and connections which owe their origin to heredity rather than to the kind of experience which the individual obtains. It must, however, be pointed out that these paths are greatly modified by the experience of the child. Those which develop early are modified by subsequent experience. And those which appear late find already developed a system of paths and corresponding mental tendencies to which they have to adapt themselves.

How, then, does this modification of tendencies already existing take place? One way is *through the agency of pleasure and pain*. We know nothing of the physical process in the nervous system which accompanies pleasure or pain. But from time immemorial men have seen that feeling is the great agent in modifying instinctive tendencies. The parent who beats his child is relying on the influence of pain to check some undesirable tendency: he desires, indeed, to produce thereby a tendency in the opposite direction—an aversion. The animal trainer who arranges that a horse shall have a piece of sugar immediately after performing some difficult feat is stamping

in a certain tendency by means of pleasure. "If the mechanical activities in a cell, as they increase, give pleasure, they seem to increase all the more rapidly for that fact; if they give displeasure, the displeasure seems to damp the activities. The psychic side of the phenomenon thus seems, somewhat like the applause or hissing at a spectacle, to be an encouraging or adverse *comment* on what the machinery brings forth."[1]

As Stout says, "there is a constant tendency to persist in those movements and motor attitudes which yield satisfactory experiences, and to renew them when similar conditions recur; on the other hand, those movements and attitudes which yield unsatisfactory experiences tend to be discontinued at the time of their occurrence and to be suppressed on subsequent similar occasions. By the working of this Law of Subjective Selection, as it is called, relatively blind and undirected activities become gradually guided into definite tracts, each advance paving the way for further progress."[2]

Another name for this law is the Law of Hedonic Selection. Let us take a simple example of its working, again quoting from Professor Stout. "There is, to begin with, a certain tendency, probably congenital, to turn the head, so as to bring into full view bright or obtrusively moving surfaces, and to stare at them. Let us suppose that the child is staring at a bright window, and that the nurse turns him away from it. He begins to cry. If the nurse turns him towards the window again, he ceases crying and wears an appearance of contentment. But if he is not passively turned again so as to face the light, his discontent will continue and will manifest itself in restless movements of the head, eyes, and body. Among these movements one may occur which restores the previous pleasant experience. Turning his head far enough in

[1] James, *Principles of Psychology*, Vol. II., p. 584.

[2] Stout, *Groundwork of Psychology*, pp. 72, 73. Professor Stout might possibly not agree that by "satisfactory" and "unsatisfactory" he means the same as *pleasant* and *unpleasant* respectively. But that is what *we* mean here, and that seems to us to be the best rendering of his statement.

either direction, he sees again the light of the window. When this success, initially due to accident, has been repeated a certain number of times on similar occasions, the required movements will be made more readily, precisely, and decidedly, other movements being cut short or suppressed altogether."[1]

A careful examination of this example will bring out still more clearly the way in which feeling is related to conation. We are told that the child "is staring at a bright window." He is persisting, then, in a given direction. There is thus conation. To what is this due? It is due partly to the intensity of the stimulus which has set up a strong excitation in the nervous system. But it is surely also due to the pleasurable character of the experience. Stout refers to it later as "the previous *pleasant* experience." And Professor James tells us: "The infant notices the candle flame or the window and ignores the rest of the room because those objects give him a vivid pleasure."[2] Pleasure, then, has the same result as the applause of an audience has on a performer. It intensifies the conation which is already in operation. This conative effect of pleasure is often called *appetition*.

But when the child is turned away, he begins to cry. We can surely infer that he is experiencing pain. To what is this pain due? One might be tempted to explain it by the fact that the duller prospect of other objects involves a disappearance of pleasure, which may be considered as somewhat painful. This circumstance may account for some small portion of the pain. But it certainly does not account for all. The chief reason for the pain is in the fact that a conation in full swing has been obstructed.

Much of our pain arises thus. It owes its existence not to the specific nature of the object presented, but to the fact that a tendency having been excited has been obstructed in its course. And, on the other hand, much of our pleasure owes its existence to the fact that a tendency, having been excited, finds suitable objects to deal with, and is able to continue its career. When the baby is turned towards the

[1] *Op. cit.*, pp. 73, 74.
[2] *Principles of Psychology*, Vol. II., p. 345.

window again, he "wears an appearance of contentment." This surely indicates pleasure. Much of this may be due merely to the fact that "the previous pleasant experience" is restored. But is there not an additional amount due to the fact that the tendency has been raised to a high pitch by the obstruction and is at length granted an outlet?

We will call such pleasure-pain, viz. that which is produced by the furtherance or the obstruction of a conation already excited, *tendency-derived feeling*. Professor Stout seems to hold that *all* agreeable or disagreeable feeling is produced in this way. But it would be difficult to show that the pain of a toothache or the pleasure of a warm bath could be derived from the fact that a strong tendency was being obstructed or furthered. We seem to be compelled, in some cases at any rate, to recognise other sources of pleasure-pain. Some experiences appear to be agreeable or disagreeable in themselves, independently of any pre-existing tendency. For instance, most psychologists agree that sensations are agreeable up to a certain degree of intensity (differing with each kind of sensation), but painful beyond that point. If there is any truth in this (it may not be true in all cases, but only in a limited number) we have instances of pleasure-pain which is not due to furthered or obstructed conations. To distinguish this pleasure-pain with respect to its origin (though, of course, it is the same kind of thing *in itself*) we may call it *intrinsic feeling*.

We need not concern ourselves much with the question whether Stout is right in regarding all pleasure-pain as "tendency-derived," or whether the view here maintained is the correct one. But we must recognise clearly that pleasure and pain, however produced, react strongly on the conation in progress. We have already noted the intensifying effect of pleasure. It remains to examine the effects of pain. We are told that if the child is not turned to face the light, "his discontent will continue and will manifest itself in restless movements of the hand, eyes and body." There is obviously conation in great force here. One might attempt to account for the whole of it as the original tendency (to stare at the bright window) which, having been

thwarted, is now raised to a high pitch. But part of it seems to be due to the pain of the obstructed tendency. We notice similar restless movements when the child is known to be in pain, and when there is no special tendency being obstructed, as, for instance, when he is suffering from wind, and is evidently trying to escape from it. This conative effect of pain is usually termed *aversion*.

Pain, however, acts not only by producing a definite aversive tendency, but often also by damping some other tendency in the career of which it may occur. The instance quoted from Stout does not show this. For the pain does not occur *in* the career of the tendency (to look at the window), but on account of the obstruction of it. Suppose, however, that a child begins to suck his thumb. He finds in this some pleasure, which augments the conation, so that it becomes fixed and invariable. It has now developed into a *habit, i.e.* a tendency which has become fixed by repetition during the life of the individual. His mother wishes to break him of this confirmed tendency. One way would be to bind the hand down so that the child cannot raise it to his mouth. Tendencies and their corresponding neural paths often die out through lack of exercise. Further, other tendencies and habits may be developed to such an extent that the disused ones, even if they still retain some force, find themselves crowded out.

But the binding down of a child's hand has disadvantages. It prevents that free activity of arms and hands which is necessary in the work of perception. It is extremely unpleasant to the child—far more so than is necessary to put an end to the habit. A better way would be to see that some unpleasant though harmless substance, such as mustard, is smeared on the thumb. The tendency now, instead of leading to pleasure, runs into pain. And it very soon dies out. Exactly how the pain works in producing this result it is difficult to say. It might, of course, still be said that there is an aversive tendency. But it is an aversive tendency in just the opposite direction to the original tendency, i.e. *from* instead of *towards* a given result. The original tendency would thus be neutralised by the aversive one.

Now, the most important task of the educator—before and beyond that of developing cognition—is the directing of the child's conations into right channels. It might appear, after what has just been said, that in those cases where the child's existing tendencies are in bad directions—fortunately many of them are not—the best means is to arrange for them to meet pain. And, conversely, in those cases where the child's tendencies are in the direction which we desire, but not strong enough, it might appear that the best thing to do is to arrange for additional pleasure to occur in connection with them. This seems a simple solution of the difficulty. It is the idea usually supposed to underlie the practice of rewards and punishments.

But a very slight examination of the problem will show that it is immeasurably more complex. If the existing tendencies were limited in number and fairly fixed in their directions, pleasure and pain could be used with considerable effect. Such conditions, indeed, exist to a large extent in the case of the higher animals. And we can *train* them to behave themselves properly with few other means than those of reward and punishment. (We can hardly speak of *educating* them.) But the tendencies of the human being are not of so simple or of so limited a kind. Those that already exist at any given moment can be directed into many different channels, and in connection with our disciplinary measures other tendencies may arise on which we did not calculate.

The higher intelligence of the human being enables him to make all kinds of distinctions impossible to an animal. And his tendencies are organised about the objects he distinguishes in complex ways which are different from those of the animal. With the *baby*, who approximates to an animal, I can indeed pursue a fairly mechanical system of rewards and punishments. I can arrange that his tendency to suck his thumb is damped by the pain which occurs when mustard is placed upon it. He does not yet distinguish the fact that it is only the mustard which prevents him getting the usual pleasure. The experience is a *whole* in which he does not discriminate the parts.

This whole is painful and he gives it up. But if the habit has remained fixed till a later stage, my problem is much more difficult. For the child now sees clearly that the pain produced is not the result of sucking his thumb, *but of the mustard which is placed upon it.* The pain does not occur in the career of the thumb-sucking tendency, but in the mustard-experience. The aversive tendency evoked, therefore, is not from sucking the thumb, but from the disagreeable mustard. I may continue to check him by insisting on mustard being kept on his thumb. But I am not now checking the tendency to suck the thumb. I am merely preventing it finding an outlet. And, for a time at least, I may be increasing it by the obstruction. If the child could get a few moments with his thumb clear of mustard, he might suck at it more greedily than ever.

Such measures of prevention as this last can scarcely be called punishments. They are artificial attempts to inject pain into the ordinary career of a tendency with a view to check it. And we have seen that they often fail of their full object, the destruction of the *tendency*, because they are clearly differentiated from it in the child's mind. Though punishment has a similar object, it is still further from forming an integral part of the tendency. For it occurs after the tendency has run through its usual course. The pain that it generates, therefore, does not damp the tendency directly, but only indirectly through the fear of punishment which is aroused. Fear, as we shall see, is an emotion connected with the strong tendency aroused to get away from some object (in this case the cause of pain —the punishment). If punishment is tolerably sure to follow a certain course of action, the only way of escaping the punishment is to avoid the course of action. But it does not follow that the *tendency* to that course of action is weakened. It is merely held in check by the aversive tendency connected with fear.

The object of the educator, however, is not merely to stop evil conations for a time, but to eradicate them from the child's nature, so that when the time comes for the child to be given his freedom, he may be able to take the right course from his own choice.

"Punishment, if effective, can only prevent the doing of the wrong action, it cannot create the right feeling."[1] There is, of course, the chance that if the evil tendency is checked for a given period, it may disappear. For, as we have seen, tendencies are apt to die out from disuse. If, however, they are grounded in strong instincts, these instincts may only be roused to greater intensity by mere repression. They may constitute a sort of smouldering volcano, ready to break out into eruption when the opportunity occurs. We have innumerable instances of young people who have been repressed by harsh discipline during their school life, and who break out into evil courses when they are freed from control.

Take now a case of reward. A young child lacks control in his excretory habits. When he shows some, he is rewarded by a piece of sugar, or by some other pleasant experience. This may not at first be definitely distinguished from the whole experience of which it forms the conclusion, and the pleasure derived definitely fixes the tendency to clean habits. If at a later stage the same means are employed to encourage kindness to his sister, they are now clearly distinguished as an end to which the kindness is only a means. It is, then, the tendency for these rewards which is being developed, and various more or less disliked activities will be undertaken to obtain them. If the rewards are discontinued, the other activities which it was intended to encourage may cease also. There is, of course, the possibility that these other activities may have evoked some instinctive tendencies, which now support them. They may also have gained more strength by reason of repetition, which generates habit.

It might appear to some readers that punishment and reward ought therefore to be discarded altogether. But this is not so. Punishment, at any rate, cannot be dispensed with. It is often the only means of stopping some tendency which must be checked *at all costs*. It must, however, be considered as a weapon which should only be used when other means fail.

What other means are there of modifying tendencies?

[1] Mumford, *The Dawn of Character*, p. 314.

By the time the ordinary child comes to school he has developed a large number of tendencies. Some are good, some bad. We wish to exterminate the bad ones, and develop the good ones. Can this be done in any other way than by appealing to pleasure and pain? The answer is a decided affirmative.

In the first place, a tendency develops by exercise. If we can arrange circumstances so that the good tendencies are often excited and appealed to, they will be strengthened. Thus, every boy likes to be thought well of, *i.e.* he has a tendency to do things which evoke admiration. If we take due notice of the good things he does, we strengthen this tendency. If, also, we begin by treating him as a person with good tendencies, he is likely to endeavour to act up to our estimation of him.

On the other hand, a tendency tends to die out by lack of exercise. If we can avoid the circumstances which excite a certain tendency we are giving it a chance to disappear. Thus, a boy may be given to envy. If we can avoid placing him in positions where he is continually being overshadowed and supplanted by others, we are giving him a chance to rid himself of this bad quality.

We have seen how by modifying the environment we can do much to call out or repress certain tendencies. There is yet another way in which the nature of the environment has its effect on tendencies. We have already noted that in so far as a tendency is fixed by individual experience it is called a *habit*. We have seen that any course of action or thought which is unfailingly repeated under certain circumstances generates some sort of habit. The firmest habits, however, are those which are generated out of, or on the basis of, some innate tendency. These, of course, might be called modified instincts. But it is usual to call them habits. And it cannot be too often noted that they are the most powerful habits. They are not merely "second nature" (as habit has been called), but they contain a basis of "first" nature.

Now any instinct which is neither good nor bad in itself may, according to the material or environment by which it is excited, or on which it is allowed to work, be

modified to form a powerful habit of a good or of a bad kind. Thus the instinct of acquisition is possessed in some degree by most children. If it is directed to the collection of specimens, pictures and stamps, it may form a valuable series of habits which increase the child's interest in various subjects of the curriculum, and thus materially aid the intellectual side of his education. It may be utilised, too, in the care of school property.

The children may be led to regard their room and its apparatus as their own, and thus become keen on keeping everything at its best. Particular reading-books may be given—at any rate for the time being—to individual pupils, and the names of the pupils stuck on by means of labels. Each pupil will thus be induced to take a pride in his set of books. In these cases, another instinct—that of self-assertion or self-display—is probably also called into play. But the instinct of acquisition, or, as it is often called, the sense of ownership, is still a dominant feature. It may also be evoked *with moderation* in connection with money, the child being induced to begin to save small sums (though not *all* his coppers) and thus to form a habit of *thrift*. But if it is concentrated almost entirely upon money and other valuables, the child being encouraged to hoard up every penny he obtains, it may lay the foundation of *avarice*, and give rise later to the excesses of miserliness, and even of kleptomania.

Some tendencies are incompatible one with another. If we excite one, we must to some extent suppress another. For instance, envy could be opposed by *esprit de corps*. A boy could be so consumed with the desire to see the reputation of his school augmented that he would be delighted with the achievements of his comrades, even though they threw his own into the shade.

Not only are some tendencies incompatible with others because of opposition in their respective directions, but there is an incompatibility due to the limited capacities of mind and brain. If a large number of good tendencies can be developed, there will be little place left for evil tendencies, which will thus be inhibited. A boy who can be induced to love his school, to be keen on gaining dis-

tinction both for the institution and for himself, to be fond of sport, to enjoy good books, to pursue some hobby such as collecting stamps or keeping an aquarium, is not likely to find time, or even to feel inclined, for the vices of idleness.

It is this endeavour to bring out the good that is in the child that can most truly be called *education*. The etymology of the word is worth considering (Lat. *e* = out of, *duco* = I lead). It implies the arranging of the child's environment and circumstances so that the best that is in him is called out.

Now punishment itself can sometimes assist in this process. Sometimes there are plenty of good tendencies, but they are overwhelmed by some evil tendency which cannot be removed by any other method than brutal extinction. For, although we have indicated some means of ridding the child of evil tendencies, which will often prove successful, it must not be supposed that these can be applied in all cases. Take the following example.

"Frank, when he was six, had for a while been away from home and on his return suffered severely from 'swollen head.' There was no managing him in the nursery. For a fortnight, life with him was endured by the nurse and the other children; it is difficult to find a word strong enough to describe the pitch of his lawlessness and even rudeness. Various plans were tried to reduce this small sinner to order. At last his mother threatened him with a whipping. For two days she was full of anxiety, dreading the punishment for him, and with the lad things were better. Then the old behaviour began again. Frank was properly whipped. The whole atmosphere of the house was different afterwards; it was as if the child had before been possessed by a devil, now angels came and dwelt in him! At home, it was the last whipping he needed for more than a year.

"Punishment had produced an effect which, from the outside, looked like moral conversion. Moral conversion it cannot be. Pain cannot turn the child from an enjoyment of wrong-doing to a love of right. What had happened was that the better instincts in his nature—better

instincts which were undoubtedly there—did not show themselves in action, because other and bad instincts blocked their path. The result of the punishment was therefore moral emancipation, not moral conversion. Effective punishment prevented any further expression of such wrong instincts in action, and thus gave an opportunity for the exhibition of the child's naturally good instincts."[1]

If we are to reduce rewards and punishments to the minimum which is the mark of the successful educator, we must know the various instinctive tendencies which children possess and the way in which they work. We also require to know the differing strength of these tendencies in the particular child with which we have to deal. For they vary greatly. In some children certain tendencies seem to be almost non-existent, in others they are inordinately strong. As indicated in an earlier part of this book, it is impossible to deal with the immense number of individual variations. The teacher must study each of his pupils for himself. All we can do here is to indicate the chief instinctive tendencies possessed by most children, and the way in which they work. This will form the subject of our next chapter.

Questions on Chapter XI.

1. Some conations are largely instinctive, or innate, some are largely due to the influence of pleasure or pain. Give examples of each and examine them.

2. Punishment often tends to reform the offender. Indicate how it produces this effect.

3. Why is it wrong to attempt to check all bad tendencies by punishment, and to encourage all good ones by reward?

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[1] Mumford, *The Dawn of Character*, pp. 114, 115.

4. How may good tendencies be strengthened without relying on an elaborate system of rewards to encourage them?

5. Mention some of the ways in which it is possible to rid a child of many of his bad tendencies without relying chiefly on punishment.

6. Why is it justifiable to use small punishments and rewards freely with very young children, though we use them sparingly later on?

CHAPTER XII.

The Instincts and Innate Tendencies.

We have seen that conation is the mental force (correlated on the physical side with nervous energy) which sustains the course of all human activity. It has also been seen that every presentation (percept, image, or idea) is from one point of view a form of conation and tends to issue in further activity, according to its own intensity and to the readiness or preparedness of the mind to go on in the direction defined by it. It owes its force to conation, but it is at the same time a stimulator, a director and a servant or instrument of conation. It is like the wise men employed by a despot. The latter supports them, but requires their encouragement and suggestion, their direction and advice, their help and obedience. Looking at the matter from the physical side, we may say that every stimulus tends to arouse a series of excitations or impulses according to its intensity or to the readiness of the nervous system to receive and respond to it. Since the states of mind and of the nervous system, which determine a given kind of response, are so intimately connected, it is often found convenient to refer to the two together at any particular time as the *psycho-physical disposition* of the moment.

We have further seen that pleasure and pain play an important part in encouraging or discouraging the tendency in progress at any given moment. They thus help to direct the course of conation and to modify its force. Pain, indeed, seems often to give rise to very strong conations (aversions) on its own account.

But the chief springs of conduct are the instincts and innate tendencies given by nature. These, of course, become greatly modified by experience. They give rise to *habits*. And we have just indicated some of the ways in which these modifications are made.

But in so far as a fixed system of habits, adequate to provide one and only one response for each situation, develops from, and takes the place of, the instinctive and innate tendencies, our modes of thought and conduct become stereotyped, thus leaving little hope for further progress.

To some extent this does take place. According to Professor James, "Ninety-nine hundredths or, possibly, nine hundred and ninety-nine thousandths of our activity is purely automatic and habitual, from our rising in the morning to our lying down each night. Our dressing and undressing, our eating and drinking, our greetings and partings, our hat-raising and giving way for ladies to precede, nay, even most of the forms of our common speech, are things of a type so fixed by repetition as almost to be classed as reflex actions. To each sort of impression we have an automatic, ready-made response."[1]

We may be inclined to think that Professor James has given to habit rather too large a place. But we must nevertheless recognise that it plays an exceedingly important part in the making of human character. And this is not to be deplored. For unless a large amount of our conduct is rendered automatic, so that it no longer requires any great effort of attention to guide it, we shall have little mental energy left to grapple with new situations.

But, as we have already noted, if *all* our conduct is habitual, there is no room for further improvement. A good *machine* is a fine thing in its place. A *man*, however, must be something more. No one who is completely swayed by habits, however good those habits may be in themselves, can live the highest life which is possible under the conditions of modern civilisation, with its

[1] James, *Talks to Teachers*, pp. 65, 66.

constant changes and consequent demands for frequent efforts of readjustment.

On the one hand, therefore, it is necessary to form a large number of good habits, so that we are carried easily through the "ordinary" duties of life, and are thus able to make some attempt at higher things; and, on the other hand, it is important to remember that if the various particular habits are allowed to gain complete sway, no more progress is possible (except that of still further fixing the habitual).

There is, fortunately, much plasticity in the human instincts and innate tendencies during the early part of life. Usually a given tendency can be evoked by a large number of differing objects or situations. And it becomes greatly modified according to the nature of the object or situation which evokes it. In this way, one and the same original tendency may give rise to good or to bad habits.

Further, the stereotyping of thought and conduct which habit involves is hindered by the large number of instincts and innate tendencies which man possesses, and by the fact that many of these arise and develop at different stages during the early part of life. There is often competition between them, thus leaving open the door for change (either good or bad), even after many habits have become fixed.

The old view was that only the brutes were creatures of instinct, and that man was almost free from it. And some seem still to hold this view. "It is often said that man is distinguished from the lower animals by having a much smaller assortment of native instincts and impulses than they, but this is a great mistake. Man, of course, has not the marvellous egg-laying instincts which some articulates have; but, if we compare him with the mammalia, we are forced to confess that he is appealed to by a much larger array of objects than any other mammal, that his reactions on these objects are characteristic and determinate in a very high degree. The monkeys, and especially the anthropoids, are the only beings that approach him in their analytic curiosity and

width of imitativeness. His instinctive impulses, it is true, get overlaid by the secondary reactions due to his superior reasoning power; but thus man loses the *simply* instinctive demeanour. But the life of instinct is only disguised in him, not lost; and when the higher brain-functions are in abeyance, as happens in imbecility or dementia, his instincts sometimes show their presence in truly brutish ways."[1]

Kirkpatrick, indeed, goes a step further—at any rate in explicitness. He appears to maintain that the very reasoning power which obscures the simpler life of the instincts is itself due to the latter. It owes its development to their multiplicity. "An animal," he tells us, "that had only one possibility of response in a given situation could make no use of consciousness. Only those animals that are sufficiently complex to have more than one mode of response to a given stimulus can profit by conscious intelligence. It is reasonable, therefore, to suppose that instead of consciousness making new movements possible, the acquisition of new possibilities of movement makes conscious intelligence possible and useful, especially in animals and children."[2]

Since each instinct is a craving or tendency to have or think or do something, it might appear to some short-sighted persons that, with a few instincts inspiring us to what we choose to call the more useful activities, and quickly settling down into habits, we could get along better than with the many impulses which are continually arising among human beings. But if what Kirkpatrick says is true, it is precisely owing to the fact that we have a large number of impulses which often compete among one another that we have developed so much intelligence. The bee, with his few definite instincts, is a very useful animal. But since only one impulse arises in response to each situation, the creature behaves automatically and makes no appreciable progress towards intellectual life. He is far from possessing that *many-sided interest* which

[1] James, *op. cit.*, pp. 43, 44.
[2] Kirkpatrick, *Fundamentals of Child Study*, p. 38.

stimulates man to his many investigations and researches. So with all the brutes. As Walt Whitman says :—

"They do not sweat and whine about their condition,
They do not lie awake in the dark and weep for their sins,
They do not make me sick discussing their duty to God;
Not one is dissatisfied, not one is demented
With the mania of owning things;"

Their wants are few, and easily satisfied. Consequently they make little, if any, progress from generation to generation.

Even before these modern views on instinct arose, some thoughtful writers were alive to the importance of a multiplicity of tendencies in the development of intelligence. Thus, a century ago M. Itard wrote "that there exists in the most isolated savage, as well as in the citizen educated to the highest pitch of civilisation, a constant relation between their ideas and their needs; that the ever increasing multiplicity of the latter among cultured peoples ought to be considered as a great means of developing the mind of man; so that it may be stated as a general truth that all the accidental, local or political causes which tend to augment or to diminish the number of our needs, necessarily contribute to extend or to restrict the sphere of our knowledge and the domain of science, of the fine arts, and of social industry."[1]

Since, then, our instincts and innate tendencies are so important, both as the foundations of our habits, and as the basis of still higher developments in the life of thought and conduct, it is necessary to examine them in more detail. Only by knowing the nature of the material with which we have to deal can we hope to be successful in producing the desired modifications in it.

Many writers do not distinguish between *instincts* and *innate tendencies*. They refer to both as "instinctive tendencies." Mr. McDougall, one of our greatest authorities on this subject, has, however, made a clear distinction between them. According to him, an instinct is "an inherited or innate psycho-physical disposition

[1] Itard, *op. cit.*, p. 49.

which determines its possessor to perceive, and to pay attention to, objects of a certain class, to experience an emotional excitement of a particular quality upon perceiving such an object, and to act in regard to it in a particular manner, or, at least, to experience an impulse to such action."[1] Human beings, in common with the higher animals, inherit a nervous system with certain paths which are already in existence, or which develop more or less spontaneously. These paths are such that when certain stimuli occur we perceive in a peculiar way. We do not merely perceive an object with the usual small amount of pleasure or pain, and a normal amount of conation. But we are thrown into a state of great excitement which is usually highly pleasurable or painful, and which is due to a disturbance of the visceral organs, giving rise to intense organic sensations. At the same time we find ourselves performing certain definite bodily actions, or at any rate tending to do so. These actions are called *instinctive actions.*

Take the case of *fear*. A child may be looking out of the window when he suddenly hears the sound of thunder. He is intensely excited internally, he screams and hides himself or runs to his mother. He has, then, the emotion of fear and the impulse to hide or to run away. All this is due to the fact that he possesses an inherited psycho-physical disposition which we call an instinct, and which is excited by certain stimuli—in this case, by a loud noise. It may also be excited, in the case of the child, by a strange face, a peculiar animal, or by darkness. But whenever it is aroused, it gives rise to the same painful excitement or emotion, and to similar movements of flight. It is a very complex but very definite reaction to percepts of certain kinds. Some writers, therefore (*e.g.* Spencer), have called it a reflex-action of a very complex nature. We have already noticed two kinds of reflex actions—*the pure reflex* (with no consciousness) and the *sensation-reflex*. We may speak of the instinctive action as a *perception-reflex*.

Instincts, therefore, involve specific tendencies—tenden-

[1] McDougall, *Social Psychology*, Third Edition, p. 29.

cies to act and think in very definite directions. But what we have called *innate tendencies* have no such definite character. They arise out of the general constitution of mind. We all have, for instance, a general tendency to imitate others. This is often referred to as the "instinct" of imitation. But it involves no characteristic emotion, nor does it give rise to any special kind of action. The actions, indeed, to which it disposes us may be as varied as those of the persons around us whom we are constrained to copy.

Since these instincts and innate tendencies are at the basis of so much of our activity, it is well that the teacher should make a survey of the principal ones, so that he may have a clear idea of the general tendencies of the human nature with which he has to deal. This, of course, will not solve the whole problem of understanding and dealing with his pupils. For these instincts and tendencies occur with varying force in different individuals. But it will put him in a position to recognise more clearly the difference between child and child, and to modify his treatment accordingly. We will proceed, therefore, to survey—

The Principal Instincts of Man.

(1) *The Instinct of Flight and Concealment with its Emotion of Fear.*—Some account has already been given of this. In man, the unfamiliar plays a large part in evoking it. The object causing fear tends to rivet the attention and to inhibit all other action but that involved in escaping or in concealing oneself. Any object which has caused great pain and which we cannot master or control, so that we feel ourselves helpless before it, seems to have the power of evoking this instinct. Corporal punishment often produces this effect in the child. The idea of it, as well as the perception of preparations for it, seems to act in a similar way to that of the percept of an unfamiliar thing. The prospect of an indefinite amount of punishment involves uncertainty. This uncertainty seems to have the same influence as the unfamiliarity of the perceptual stimulus in the more primitive cases. It is well

known that the prospect of a punishment which is unknown, both as to kind and amount, evokes more fear than that of one which can be definitely imagined and estimated.

But we must not ignore the effect of pain in all such cases. When great pain first occurs it initiates a strong aversive tendency, which is re-excited at the idea of a repetition of the experience, or at the perception of a situation similar to that experience. Possibly, indeed, pain has been the origin of the dread of the unfamiliar. In the long history of the race, pain may have played its part in causing all unfamiliar things to evoke this powerful emotion and the strong aversive tendency in which it issues. Our remote ancestors may have frequently stumbled into painful situations when venturing beyond the confines of the limited sphere in which they lived and to which they had become familiar, so that they were disposed to feel dread whenever they found themselves out of the well-known home.

It seems probable that both severe pain and the unfamiliar owe much of the influence which they exert to the co-operation of a more general and fundamental innate tendency—that of *self-preservation*. In so far as the individual is able to *deal* with the painful or unfamiliar objects, or at least to ignore them, passing on to other things, he does not experience fear. In so far, however, as they come upon him in irresistible fashion, giving him no opportunity to grapple with them, not only making him feel helpless before them, but having the appearance of being on the point of coming to close quarters with him, they call out the tendency to self-preservation.

We speak of the object of fear as *danger*. Our remote ancestors must frequently have been overtaken and mauled by unfamiliar things and creatures in order that the tendency in question should be aroused innately in us by so many strange objects. It is to be noted in this connection that *moving* things are the more likely to evoke fear, "especially men or animals advancing toward us in a threatening way."[1] The fact that loud noises and dark-

[1] James, *Principles of Psychology*, Vol. II., p. 417.

ness give frequent occasions for fear must also be explained largely by associations formed in the course of racial development. We must remember that wild beasts give vent to roars during their attacks, that any other loud noise is usually made by some irresistible force before which primitive man would feel himself powerless, as the fall of a huge tree, a thunderstorm, a gale, a cataract, and so forth. Our ancestors would therefore be constantly on the alert for disturbing sounds. With respect to the fear of darkness, we must bear in mind that "our savage ancestors through innumerable generations were accustomed to meet with dangerous beasts in caverns, especially bears, and were for the most part attacked by such beasts during the night and in the woods, and that thus an inseparable association between the perception of darkness of caverns and woods, and fear took place, and was inherited."[1]

Education endeavours both to rid the child of unnecessary fear, and to make use of the instinct in other cases as an inhibitor of undesirable tendencies. Since the unfamiliar arouses fear, we can often diminish the latter by making the child familiar with the cause of his dread. As we have already seen, we have in some cases to utilise the fear of punishment as the only means of definitely checking certain undesirable tendencies.

(2) *The Instinct of Repulsion and the Emotion of Disgust.*—Like the last, this is an aversive tendency. In its primitive form, it involves the rejection from the mouth of noxious and evil-tasting substances, and the shuddering aversion from the touch of slimy and slippery things. In the course of human development, many kinds of things become capable of exciting the instinct on account of their resemblance to the primitive excitants of the tendency. The actions, speech, or general character of a man may cause our disgust.

Here, again, we see how an original *perceptual* reflex may be excited by *ideas* having something in common with the concrete objects which first gave rise to the reaction.

[1] Schneider, *Der Menschliche Wille*, p. 224.

The teacher can use this fact in connection with the moral education of his pupils. It is not possible to hide from the children, whether in the sphere of real life or in that of literature (which is a representation of life), the existence of evil characters. But it is possible to see to it that these things come under their notice in such a way and in such circumstances that their disgust is excited to the full. Evil characters must not be dwelt upon so that they hold the attention of the children too long or too vividly; they should be shown up against the background of noble characters. As we shall see later, the teacher's emotional attitude with regard to them is liable to communicate itself to the children by sympathetic "induction." The teacher can do much by his treatment of the lessons (especially in history and literature) to evoke desirable emotions in the minds of his pupils.

(3) *The Instinct of Curiosity and the Emotion of Wonder.*—This is not an aversive, but an appetitive tendency. Its impulse is to approach and to examine more closely the object which excites it. The object must be unfamiliar. We are not curious about an object which we already fully understand. But it must not be exceedingly unfamiliar. If it is, it will either be ignored or feared—the former in the case of objects which are not striking, the latter in the case of those which produce strong impressions. There must, therefore, be some familiarity as well as unfamiliarity if curiosity is to be excited. The object must be similar to, yet perceptibly different from, familiar objects habitually noticed. Often an object is on the border line between the realm of the unfamiliar, which causes fear, and the partially familiar, which excites curiosity. "Hence the two instincts, with their opposed impulses of approach and retreat, are apt to be excited in animals and very young children in rapid alternation, and simultaneously in ourselves. Who has not seen a horse or other animal alternately approach in curiosity, and flee in fear from, some such object as an old coat upon the ground?"[1]

[1] McDougall, *op. cit.*, p. 58.

The instinct of curiosity is a most important one from the teacher's point of view, particularly with respect to instruction. It is the motive power underlying much of our scientific investigation (though other instincts which we shall presently note assist it—*e.g.* the instinct of self-display). And the teacher must evoke it if he is to obtain a real interest in his lessons. In his teaching, he must avoid confining himself on the one hand to the very familiar, and on the other hand to the very unfamiliar. The former will bore his pupils, because it provides no incitement to further mental activity. The latter will fail to interest them, because their mental activity is baffled by it; it has no connection with the knowledge which they already possess; they have consequently no mental apparatus with which to grasp it.

But why does not the unfamiliar cause fear in these cases? If it could, it would secure attention, though not that attention that develops into further attacks on the subject, but rather that which is necessary to get away from it; for fear is an *aversive* tendency. There may be some cases in which what is presented is so unfamiliar, and at the same time so striking, that fear is evoked. But the conditions of a lesson in school are all against fear. It has already been noted that probably the unfamiliar owes its power of producing fear to a deep-seated, though often hidden, connection between strange objects and the experience of pain. The terrible is apprehended not merely as the incomprehensible, but as the hurtful. Now the whole attitude of both teacher and scholars in a lesson is opposed to any apprehension of harm. The unfamiliar is therefore merely incomprehensible. It is not impressive or striking, and it is consequently either ignored, or, in so far as some attention to it is constrained, it is a source of *ennui*.

It is necessary, therefore, for the teacher to arrange his lessons so that the pupils are able to apprehend the new on a background of the old. He must see that the lesson is neither too new nor too old; he has to hit the right proportion between the two. In reflecting on his lesson, he must answer the three questions—(1) What do the

pupils already know on this subject? (2) How much new matter can be profitably added in the time allotted? (3) How can the new be connected with the old?

This is partly what is meant by the educational maxim: *Proceed from the known to the unknown.* The Herbartian method of arranging a lesson recognises this necessity to the full. It begins with *preparation, i.e.* the evoking in the minds of the pupils, the raising to full consciousness, of all the existing ideas which will help in the comprehension, or, as it is often called, the *apperception* of the new. It matters little whether we call it *preparation* or *introduction.* All good teachers recognise its necessity.

It must not be forgotten that, after all, the *new* is the stimulus to curiosity. This is all the more necessary to remember because much of our work in school consists of *repetition.* *Répétez sans cesse* was Jacotot's motto in teaching. But continued repetition destroys the interest born of curiosity. The intelligent teacher will, however, find means to introduce something of the new even here. He will supplement Jacotot's motto with the proviso—*Ne répétez jamais deux fois de la même façon.* Even when he has to go over the subject again, he will attack it from a somewhat different point of view. He will, at any rate, evoke new motives for the attack. If he can do nothing else, he will make the revision into a competition between section and section, or between boy and boy, or he will propose some experiment to the boys, inducing them to try how much they can learn in one way, how much in another. But these methods, especially those involving rivalry, make appeal to other instinctive tendencies. We shall deal with these later.

(4) *The Instinct of Pugnacity and the Emotion of Anger.*—This instinct has no *special* kind of object which appeals to it. Any object which causes or implies opposition to the free exercise of one of the other impulses tends to excite it. Its impulse is to break down and destroy the opposition. Although parents and teachers find this instinct very troublesome when it conflicts with their designs, they should remember that it involves great conative force. It is a matter of common know-

ledge that many boys who have given much trouble to their governors during childhood have achieved great success in after life. A man devoid of the pugnacious instinct would not accomplish much. As self-control is developed, the crude expressions of anger disappear; the energy of the instinct tends to reinforce the impulse of the moment, and so helps the individual to make greater efforts to overcome his difficulties.

(5) *The Instincts of Self-Assertion (or Self-Display) and of Self-Abasement (or Subjection) and the Emotions of Elation and Subjection.*—These instincts can only arise in our relations with our fellows.

They are essentially *social* instincts. They require spectators, though at any given moment these may be only imagined.

The instinct of *self-display* shows itself very early in human life. In its higher forms it involves self-consciousness, and is known as *pride*. But it can be noted long before self-consciousness develops. Even the higher animals show signs of it. "Perhaps among mammals the horse displays it most clearly. The muscles of all parts are strongly innervated, the creature holds himself erect, his neck is arched, his tail lifted, his motions become superfluously vigorous and extensive, he lifts his hoofs high in the air, as he parades before the eyes of his fellows."[1] The young child's showing off before the admiring gaze of his elders and his repeated commands, "See me do this," "See how well I can do that," are expressions of the same tendency. This self-assertion is one of the most imperious demands of our nature, and it is a cause of much of our most persistent endeavour. We shall see that it is one of the factors in the tendency to emulation or rivalry. The teacher, therefore, should not check it brutally, but rather utilise it to lead the child to make efforts in those directions which are desirable. It need only be checked when it conflicts with the development of other members of the community.

The instinct of *subjection* shows itself "in a slinking,

[1] McDougall, *op. cit.*, p. 62.

crestfallen behaviour, a general diminution of muscular tone, slow restricted movements, a hanging down of the head, and sidelong glances."[1] Like the instinct just dealt with, it requires self-consciousness in its higher forms. But simpler forms show themselves where no self-consciousness is possible. Thus a young dog will sometimes show subjection on the approach of a larger and older one; "he crouches or crawls with legs so bent that his belly scrapes the ground, his back hollowed, his tail tucked away, his head sunk and turned a little on one side, and so approaches the imposing stranger with every mark of submission."[2] The teacher is constantly making use of this instinct. He appears as a creature bigger, stronger and wiser than the child, and the latter, in spite of self-assertive and other tendencies which manifest themselves from time to time, feels himself greatly inferior, and is disposed to subjection and obedience. It is this attitude, often combined it is true with others of which we shall speak later, which enables the teacher to make so great an impression on the child. It leads the child to accept a great deal on the mere word of the teacher, to imitate much of the latter's conduct, and even in some degree to reflect his emotions. And at a time when the child is unable to think and to choose for himself, it is right that the teacher should make full use of his power.

Reference was made on the first page of this book to "the power of control, a somewhat mysterious means of influencing others to attention and obedience." There is little doubt that this power is largely due to the fact that some teachers have a personality which calls out the instinct of subjection in the children. Usually such teachers have a strong instinct of self-assertion in their nature. Many, of course, possess this without being aware of it. A training college student was once being interviewed with respect to her fitness for appointment, and it was noted that she had an excellent mark for discipline. She was asked how she managed to obtain such strong control of her classes. Her reply—due

[1] *Op. cit.*, p. 64. [2] *Op. cit.*, p. 65.

probably in part to nervousness—was, "I don't know." She was, however, indicating a fact of great importance. Her personality was such that children listened to her, and did what she told them, "quite naturally."

Few teachers are able to control in this easy manner. Those students, however, who have little power of self-assertion, who find children continually in opposition to them, would do well to question seriously their fitness for the teaching profession. Such individuals will achieve little with children, and their lives will be most miserable. An adequate amount of impressiveness in the presence of a company of children is a necessary part of the equipment of the teacher. Some are specially blessed by nature, and have considerable advantages with which to start. A good physique, a strong deep voice, a determined look, a confident manner and bearing, athletic prowess well known to the boys, all these help. But those who, being without these advantages, yet possess determination, can go far, by careful attention and effort, to improve their impressiveness. One should cultivate self-control and reserve. It is not good to become very familiar. The children must not know their teacher too well or too quickly. Familiarity breeds contempt. The teacher should, during the early stages at all events, remain somewhat of an unknown quantity. He should be chary of his punishments and threats, trying to get on as long as possible on the assumption that things are bound to be satisfactory. Many young teachers, in their anxiety to impress the boys, run through the whole gamut of punishments which they can inflict in the course of a few hours. They are then left with nothing further to do, *and the boys know precisely their limitations.* Their loss of temper, their threats, and their vain commands only serve to weaken still further their position. Instead of invoking the *negative* self-feeling of the boys, they now excite their *positive* self-feeling, and attempts at insurrection become more and more audacious until a stronger person is required to interfere in order to save the situation.

Good knowledge of his subject and careful preparation of each lesson help in giving the teacher confidence, and,

further, enable him to interest the pupils. During the time that these are thoroughly engrossed in the lesson there is little opportunity for their opposition to show itself. It should be remembered, too, that thorough knowledge of a subject is one of the means of impressing others with one's superiority. And even children are to some extent impressed by the learning and ability of their teacher. He should not only know his lesson, but should have all the technique of school management at his fingers' ends, so that he goes about his work in business-like fashion. If he has not a naturally good speaking voice, he can at any rate do much, by modulation and variation of loudness and speed (in harmony, of course, with his subject), to make his speech effective and pleasant. He must also cultivate clearness of articulation and aptness of expression. Finally, he must be in sympathy with his children, and should show a real interest in them, both in school and out. Although it is necessary to be firm and somewhat aloof, it is necessary also to be kind. A cold masterful attitude may evoke little response but opposition, especially if the teacher has little real impressiveness. But a masterful attitude combined with kindness will scarcely fail to produce the right effects. Some teachers, indeed, have ruled principally by love. This, however, has usually been under special circumstances. The ordinary classes in public elementary schools cannot be ruled satisfactorily in this way alone. In these cases, "the affection which is based upon a wholesome awe is that which the master should seek to inspire."[1]

(6) *The Parental Instinct and the Tender Emotion.*—This, of course, is an instinct which is comparatively late in developing. And for the teacher of young children, it plays a part of less importance than it does from the point of view of the sociologist, who concerns himself with the whole human race. But according to McDougall, it is at the root of all tendencies which exhibit love and tenderness; from it spring generosity, gratitude, love, pity, true benevolence, and

[1] Keatinge, *Suggestion in Education*, p. 81.

altruistic conduct of every kind; it is the chief source also of moral indignation, and of the love of justice.

If this is so, we can only explain the existence of some of these qualities in children by the fact of imitation or sympathetic "induction," and also, perhaps, by the fact that, although the instinct is not fully developed in them, it begins to show itself in partial and incomplete forms long before it arises in its full strength. This view, at any rate, will console the teacher who reflects bitterly on the lack of altruistic tendencies which he finds in his pupils. He will do well to remember that it is useless to look for the mature fruit before the plant has fully developed. This thought, however, will not prevent him from doing his utmost in cultivating, by example and precept, all the finer altruistic qualities of which his pupils are capable.

The seven instincts already described seem to be the most definite. There are many others of less well-defined emotional tendency, to some of which reference is necessary, since they affect the teacher's work. The *gregarious instinct* prompts individuals to seek the society of their fellows. It is no doubt very strong in some cases, and might be cited as one of the motives which induce a child possessing it in a high degree to come to school. The separation of a child from his comrades, though indeed wounding him in other ways, involves some pain on account of this deprivation of fellowship.

Reference has already been made to the *instinct of acquisition*, as well as to some of the uses to which it may be put. There is also a definite *instinct of construction.* Children soon show an impulse to make things, though the things may only be mud pies or toy houses and bridges. This instinct is utilised in handwork. For this, "*constructiveness* is the instinct most active; and by the incessant hammering and sawing, and dressing and undressing dolls, putting of things together and taking them apart, the child not only trains the muscles to co-ordinate action, but accumulates a store of physical conceptions which are the basis of his knowledge of the material world through life." [1]

[1] James, *Talks to Teachers*, p. 146.

Closely connected with, and not readily distinguishable from, the instinct of construction is the *instinct of manipulating objects*, which is also difficult to distinguish from some of the more general innate tendencies which we shall presently proceed to discuss, especially from the tendency to play and the still more general tendency to bodily activity. It is this instinct of manipulation which leads a child to take things to pieces, and often to commit what appear to be wanton acts of destruction. There is no doubt that the instinct of curiosity often co-operates with it.

Of other prominent instincts, such as the *sexual instinct* and that of *feeding*, we shall say nothing here.

Before proceeding to enumerate the more definite of the innate tendencies it will be well for the sake of comparative completeness to give independent mention to one impulse which seems to underlie and support many of the instincts which have already been recognised. It is often itself referred to as an instinct, and is called the *instinct of self-preservation*. It may be defined as the impulse to continue one's existence, and it is, of course, essentially egoistic. Under the most favourable conditions of modern civilisation it seldom appears as a separate impulse, nor indeed do the instincts most closely bound up with it (*e.g.* fear and the feeding instinct) exert such sway over a man's actions as they have done, and as they continue to do, under the more primitive conditions of life. The impulse to self-preservation remains in the background during most of the life of a healthy, cultured man, who enjoys almost automatically all the chief benefits of modern society.

But at any moment the impulse may leap from its apparent sleep to the most vigorous life. The "object" which excites it is anything which checks, or seems to check, the general life-process. A person thrown into the water struggles for existence. If the vital forces sink low in illness, and especially if there is difficulty in breathing, we often note a violent attempt to fight against the restricting influences. Many writers affirm that this impulse is ultimately responsible for much of the effort made by man in his struggles with nature. That it is

innate is shown by the fact that sometimes those who, tired of life, throw themselves into the water are seen to begin at once to struggle for existence. It can hardly be said that they suddenly "change their minds." It must rather be affirmed that the changed circumstances arouse the impulse of self-preservation.

We come, now, to deal with those general tendencies of human nature which, though connected with some of the instincts already described, and often, therefore, called "instincts," are better described as—

Innate Tendencies.

(1) *Sympathy or the Sympathetic Induction of the Emotions.*—The primitive sympathy to which reference is here made implies none of the higher moral qualities usually connoted by the term. It is, indeed, an element of the higher forms. But it is not to be confused with them. It shows itself on the perceptual plane, and requires no ideation or imagery to account for it. It is well known that if one animal in a herd of wild beasts shows fear and rushes off in flight, the others may follow suit. This does not necessarily imply that they perceive the same thing. All that is necessary to account for it is that the psycho-physical disposition which we call an instinct is capable of being excited not only by certain unfamiliar objects but also by the perception of manifestations of the instinctive emotion in other members of the same species.

The sympathetic spread of emotion among children occurs in the same way. We often call it the "sympathy of numbers." The intelligent teacher knows that if he can obtain the emotional attitude he desires from the majority of his boys, the others are likely to be similarly affected. But he knows also that a marked departure from this attitude on the part of one or two individuals may rapidly spread to the majority. Accordingly he endeavours on the one hand to keep the majority in sympathy with him, and on the other to concentrate his influence on the one or two "dangerous" members of the class, so that they are unable to withstand the force of his

stronger personality. He is able to succeed in the latter task in so far as his endeavour in the former direction accomplishes its purpose. Hence the need of keeping in sympathy with the majority of the boys. Unless the teacher can feel that the bulk of the boys are with him, he cannot hope to hold his class. He must be careful, therefore, to do nothing which estranges him from the rank and file. This does not mean that he is to truckle to the lower tendencies of his boys. As a rule, if he deals fairly with them, so that they feel him to be in the right, he will carry them with him. He can be firm; but he must be friendly. When he has achieved this relation with his boys, he will find it possible to bring his whole personality—supported also by the general "tone" of the class—to bear upon the few individuals who are likely to challenge his authority. Many young teachers fail to understand the true position. They imagine that by inspiring a wholesome dread throughout the class they will be able to coerce all the boys into the proper attitude. They fail to see that they are running the risk of evoking a spirit of angry rebellion, which may spread through the whole class and turn even the most well-meaning boys into enemies of the teacher's authority.

With boys, as with adult human beings, there are *leaders*. They are not always the most intelligent, or the most gifted in other ways. They are not always definitely recognised as leaders by the other boys, nor are they themselves always fully conscious of the position which they hold. But the intelligent teacher can soon "spot" them, though it is often advisable that he should not add to their importance by proclaiming his knowledge. When the general attitude of a class is so undesirable that the possibility of "getting a majority" by direct methods is small, it is sometimes best to attack the difficulty through these leaders. If the teacher can secure their sympathy and co-operation, the work of revolutionising the whole class is greatly facilitated. Often the fact that they themselves are not aware of their position as leaders renders the teacher's task more easy. They are proud of the confidence reposed in them—*e.g.* of being made monitors—

little knowing that they are being converted from leaders of the rebels into active supporters of the government.

(2) *Suggestion and Suggestibility*.—The word "suggestion" is used with varying meanings, even in psychology. It is sometimes used to indicate the recall of something to mind. We have seen, in dealing with memory, that one thing often recalls or "suggests" another which has become connected with it in the mind.

This is not the meaning dealt with here. *Suggestion* in the present instance is the name given to the process whereby one person is led to believe something, and often to act upon it, without any definite grounds for his belief, but merely on the statement, or under the influence, of some other person. Or, to use McDougall's words, "*Suggestion is a process of communication, resulting in the acceptance with conviction of the communicated proposition in the absence of logically adequate grounds for its acceptance.*"[1] The phenomenon has been noticed most definitely in abnormal cases, such as in hypnosis. But we all have some suggestibility, *i.e.* an innate tendency to believe what we are told, or what is otherwise indicated to us by certain persons. The degree of suggestibility varies from one individual to another, and in the same individual at different times. Persons in whom the instinct of subjection is much stronger than that of self-assertion have usually great suggestibility. But most of us experience subjection when under the influence of certain persons or institutions. We all tend to accept a great deal without challenge on account of the impressive character of the source of the suggestion.

This kind of suggestion is called *prestige suggestion*. Connected with it is the fact that in many subjects our knowledge is deficient, or poorly organised, so that we are only too ready to accept the *ipse dixit* of some great authority. As we have already noted in dealing with the instinct of subjection, children are normally in this position with respect to adults, especially with respect to those to whom they naturally look up—their parents and teachers.

[1] McDougall, *op. cit.*, p. 97.

And these have a right to use the suggestibility of children in the interests of morality, impressing precepts and maxims upon their minds long before they can arrive at the stage when reason can be appealed to in any great degree.

It is to be remembered, however, that the person who wishes to exert this power over the children must be highly respected. The man of weak personality can do far less in this respect than the strong teacher. Indeed, he sometimes produces an effect which is quite the reverse of what he intends. For there is such a thing as *contra-suggestion.* When the boys do *not* feel the superiority of the teacher, their self-assertiveness may take the form of believing or asserting the direct contrary of his teaching. Unless a man has great personal influence over his boys, it is often dangerous for him to attempt to preach very much. Boys, especially older ones, have an aversion to this kind of thing. For this reason Mr. Keatinge advises the introduction of suggestions in most cases in an indirect fashion. He advocates a surreptitious presentation of the needed suggestions in connection with the ordinary work, embodied as it were in the matter which the boys are studying apparently for another purpose. He tells us that "new ideas can be introduced so discreetly that no reaction is aroused, that sleeping dogs can be let lie, and the subject remain sublimely unconscious that he is being 'got at.'"[1]

A suggestion is usually better than a command. Although the former is as far from giving a reason as the latter, it nevertheless appeals to the child's initiative And it cultivates a better relationship between teacher and child than a continual attitude of command. "Certainly there are occasions, especially in early life, when definite command alone is adequate to meet the situation. Equally certain is it that suggestion should be increasingly the rule, command more and more the exception as the child increases in intelligence, foresight, and self-control."[2]

[1] Keatinge, *Suggestion in Education*, pp. 76, 77.
[2] Welton, *The Psychology of Education*, p. 162.

But as this occurs, suggestion should gradually change into *advice*, in which reasonable grounds are more and more incorporated. In this way, the child is imperceptibly led from the stage of obedience to command, which implies control from *without*, to a more and more complete direction of his own actions, *i.e.* to control from *within*.

While suggestion is a worthy instrument in certain subjects, it must not be abused. In science, history, geography, arithmetic, and even to a large extent in literature, the teacher's chief aim should be to induce the children to investigate and to come to conclusions for themselves. They should not be led to adopt an attitude of passive acceptance of all that their teacher tells them.

Many teachers are continually abusing this power of suggestion without being in any way conscious of their error. In the field of questioning it can be abused in two ways—(1) by suggesting wrong answers in cases where the children would probably obtain the right ones, if left to themselves, and (2) by suggesting right answers which have the appearance of proceeding from the children's reflexion, but which are really due to the teacher's "lead."

With respect to the first of these errors, it is to be feared that some conscientious teachers are too prone to inveigling children into the wrong course of thought, and then "rounding on" them and upbraiding them for allowing themselves to be thus influenced. They assume that, if the children are in possession of the right ideas on a given subject, they should be proof against all attempts to lead them astray. In other words, such people postulate in the children that firm hold of truth which is only to be expected in the case of the experienced, confident, and well-trained man of science. They forget that the same ascendency which they are only too willing to exert over the children's minds in questions of morals and taste will maintain its sway through all matters in which they choose to employ it. By all means let us try to develop independence of thought in children. But let us remember that their hold of truth is feeble, that they can easily be shaken off, and that it is therefore usually best to avoid disturbing them when they are on the right track.

Teachers of the kind referred to would do well to try some such experiments as the following.

Show the class the portrait of a man without any hat on. Give only a few moments for the examination of it. Then remove it from observation and ask: "Had he a *straw* hat, a *bowler* hat, or a *high* hat?" Let the expression and tone imply that it *was* one of the three. Require each child to *write* his answer. (If a sharp and bold-minded boy were by chance to answer orally: "He had no hat at all," many of the others would pluck up courage, and likewise answer according to their own observation.) It will probably be found that many of the children will state definitely that there was some kind of hat, and will end by being persuaded that they actually saw it. If, however, the question asked were, "Had he a hat on?" many more boys would give the correct answer. (This might be tried in another class under similar conditions). Similar errors can be obtained by drawing two circles of equal size on the blackboard, and writing a large number in one, a small one in the other, thus—(2) (89). If the circles are not too close together, so that their similarity in size is not over-conspicuous, it will be found that the large number suggests in a good many cases a superiority in the size of the circle containing it.

As to the second error, that of suggesting right answers instead of requiring the children to arrive at them by independent thought, this is all too common. The *leading* question is not confined to the law courts. Elliptical questions—*i.e.* statements which only require an obvious word or two to complete them—are extremely rife. Thus the teacher says: "Alfred fought against the Danes until they were glad to ask for . . . . ?" and gets some such answer as "Peace," from the children. But perhaps the most common form of leading question is that requiring "Yes" or "No" for an answer, and indicating more or less clearly by its form, or the tone in which it is uttered, which of the two words is expected. Even when no very definite indication is given, such questions should not be very frequent, since at the best they tempt the child to guess. For he knows that he is as likely to be right as

wrong. And he is usually ready to take a sporting chance.

It must not be thought, however, that the answers "Yes" and "No" are always to be avoided. Often the child may know that, whichever answer he gives, he will be required to state his reasons. Under such circumstances the question will really stimulate thought. Further, there are often other justifications for leading questions of all kinds. The object of a question is sometimes merely to secure a little more attention. And this is often necessary with young children. The requiring of an immediate and easy response—sometimes even a collective one—is often a good means of bringing stragglers to order without friction. It is therefore to be observed that no absolute rules with respect to the nature of questions and their answers can be framed. Almost any kind of question or answer may be justified by special circumstances. The essential thing, here as elsewhere, is to understand the general principles, and then to use one's discretion in applying them in any given conditions.

(3) *Imitation.*—The tendency to imitate the actions or bodily movements of others has been called by many writers an instinct. But it has no special emotion, nor any *characteristic* action, and is therefore best described as an innate tendency. There are various degrees of complexity in the form which the tendency takes. The simplest is the copying of actions expressive of emotion. This has already been noted under "sympathy." A higher form is that in which we definitely note the action of others and then find ourselves imitating them, though not with very deliberate intention. The *idea* of the action in our minds issues in the corresponding movement. When the imitation is definitely deliberate, as when we decide to copy some model which we admire, the highest form is reached.

Imitation is the way in which we acquire skill in many departments of activity. In speech, gymnastics, writing, drawing, and general deportment, as well as in sports and playful activities, it is the predominant factor. The chief recommendation to make is that the models should be

good, and should be clearly presented to the children. The teacher should always bear in mind that his actions are being watched, often more carefully than he imagines, by his pupils, and that the necessity of setting a good example in *all* the details of his procedure is paramount.

(4) *Play.*—"Shut a boy up in a room to keep him out of mischief, and if he has no opportunity to climb or to use the furniture for constructive purposes, or to use his hands in any way in making or drawing or destroying, then his energies will escape through his vocal organs, or he will simply pound on the floor or walls or turn somersaults."[1] In other words, the healthy child has a tendency to *play*.

Different explanations have been given of this tendency. According to Spencer, it is due to a surplus of nervous energy. There is some truth in this. All healthy children must be active, must be *doing* something. And from this point of view, the tendency to play may be called a general tendency to movement. But this does not seem to explain all. For children and animals will continue to play till they are quite tired. Others maintain that there is an inherited tendency to repeat the actions of our ancestors, to traverse once again the various stages of activity through which the race has passed. There seems to be little foundation for this. Professor Karl Groos considers that play forms a preparation for after life, that the various instincts arise and exercise themselves during childhood so that they are ready for more serious matters when the demands of real life are made. This seems to contain some truth. But it is to be noted that the instinctive actions performed are not of exactly the same kind as those of adult life. Young dogs will play at fighting without hurting one another. They seem, then, to have a modified form of the combative instinct.

A motive which often co-operates with others in play, and which in human beings is seldom lacking, is the desire to get the better of others, to *emulate* them. This is a most important element in such games as chess, tennis,

[1] O'Shea, *Dynamic Factors in Education*, p. 4.

cricket, football. It is often referred to as a distinct elementary instinct, but it is most probably derived from some of those instincts already described. It contains something of the instinct of self-assertion, but still more of the combative instinct. The latter seems to be its chief ingredient, though in a somewhat modified form. McDougall suggests that this impulse of rivalry is a differentiated form of the combative instinct, probably evolved in the animal world to secure practice in the movements of combat. Professor James tells us that it springs out of imitation. This is true. But imitation alone cannot account for it. We *begin* by imitating others. We *go on* to emulation of them. And in this the instincts of self-display and of pugnacity must be recognised as important factors.

The peculiarity of this impulse to emulate is that, unlike many other innate tendencies, it increases in force and in the field of its operation with the growth of self-consciousness. It often comes to be the dominant motive in life. We strive to "go one better" than our colleagues. "So we have the paradox of a man shamed to death because he is only the second pugilist or the second oarsman in the world. That he is able to beat the whole population of the globe minus one is nothing; he has 'pitted' himself to beat that one; and as long as he doesn't do that nothing else counts."[1] Professor James, indeed, is so much impressed with the importance of this tendency to rivalry that he says: "Nine-tenths of the work of the world is done by it."[2] This is possibly an exaggerated statement. It serves, however, to call attention to the extreme importance of emulation as a motive, and will justify us in dealing more fully with this matter presently.

The teacher must recognise the need of play in the young. Play is, of course, a form of recreation. But it is more than that. To the very young child it is everything. And the early lessons in the infant schools appeal to it

[1] James, *Principles of Psychology*, Vol. I., p. 310.
[2] *Op. cit.*, Vol. II., p. 409.

continually. The teacher, however, gradually requires the children to control themselves, and to give attention to many things to which they would never attend spontaneously.

But even when the more serious work is in progress, something of the spirit of play may still be aroused: the impulse to rivalry can be utilised. Competitions of various kinds introduce a new life into many of the repetitions and exercises which are necessary to progress, but which are very dull in themselves. It might be objected that if competition becomes too keen, there is danger of envy and hatred; and further, that the boys who always get beaten must soon lose heart. But competitions need not always be between boy and boy. Section can be pitted against section, class against class. Lastly a boy can be induced to emulate *himself*. From time to time, he should be led to compare his work of the present with that of the past, he should be praised for improvement, and incited to progress still more in the future.

The spirit of emulation is perhaps more widely utilised in French schools than in English ones. This is possibly due to the influence of the Jesuits, whose scholastic institutions were, for a long time, more efficient than any others. It is true that with these teachers rivalry was carried to inordinate extremes. Often each boy was definitely pitted against another, and required to concentrate all his efforts upon beating him, so that the element of play was overwhelmed by a spirit of bitter competition—envy, hatred and malice being thereby fostered. But these vices are almost completely avoided in the present day. In the first place, each boy is not incited to beat a special rival, but to work for the honour of himself, his class, and his school.

In most classes in French elementary schools there exists a *cahier de roulement* (circulating exercise book). This is used in turn by each boy in the class for one day, in place of his ordinary exercise book. At the end of two or three months this *cahier* has thus passed completely round the class, and contains a specimen of the work of each boy. It is often asked for by the Inspector, as an indication of what the class can do. The boy who holds

it on any given day cannot fail to experience a strong impulse to do his best, both for his own reputation and for that of the class. (And when he has thus produced good work, this can be used as a standard whereby his further work in his own particular book can be judged.)

The idea of emulating *himself* is more particularly inspired in the boy by the *cahier de devoirs mensuels* (monthly exercise book). Each boy has one of these, and it is given to him once a month for the purpose of one exercise. The pages are carefully numbered, in order to prevent the possibility of bad work being torn out. As the months and years pass, there grows up a collection of tasks done by the boy at regular intervals. And it is, of course, expected that definite progress shall be shown from month to month, and from year to year.

A similar object is sometimes striven for in connection with the fortnightly reports on the boys which many schools send to the parents. A small book for a whole year's reports is usually printed. And this has sometimes a table giving a summary of the marks [for punctuality, regularity, conduct and work in school, home lessons and weekly examinations (one subject being usually tested each week)] for the whole period. The table is so arranged that the position of a dot indicates the degree of excellence attained each fortnight. By joining the dots a "curve" is produced, which indicates progress or retardation according as it rises or falls. It is almost unnecessary to add that these records can, at any rate in the case of the upper classes, be made by the pupils themselves, under the supervision of the teacher. Fig. 19 gives a portion of the actual record of a good pupil, the maximum marks obtainable being 30 for each fortnight.

(5) As already hinted, the tendency to play is closely connected with, and cannot be definitely differentiated from, that *general tendency to be doing something* which characterises all healthy human beings. Conation is not only dependent on a healthy body full of life and vigour, but the latter necessarily implies the former, though the directions which the conations take may be extremely varied. It is doubtful, indeed, whether the usual meaning

of the term *laziness* has any foundation in fact. This term either implies that the boy or girl in question is deficient in health and vigour, being of a specially weak or sluggish physical constitution, or it must mean that the individual

WHAT I HAVE BEEN WORTH UP TO THE PRESENT TIME.

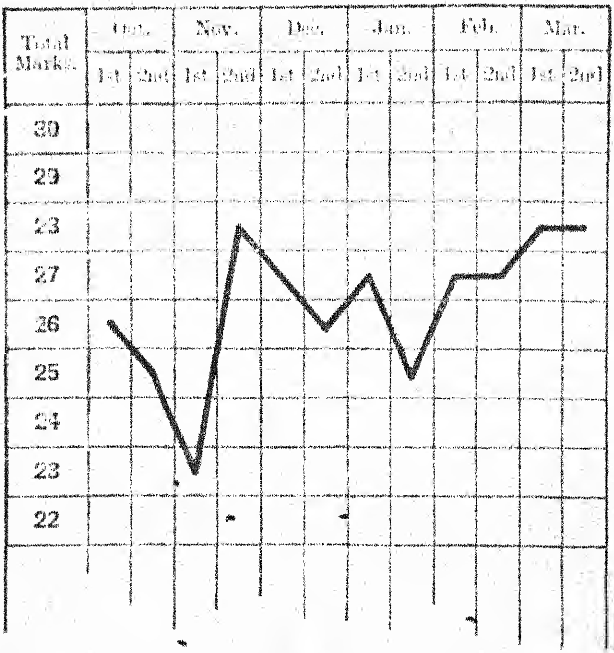

Fig. 19.

has conations in other directions, but not along the lines *proposed* by the teacher. This is shown by the fact that many of the pupils termed "lazy" in school are extremely active outside. And the obvious remedy in school is to modify the methods, and sometimes the matter, so that

appeal is made to some of the instincts and innate tendencies of these pupils. "Good teaching so arranges the work of the school that a wide range of capacities may be utilised, and that instinctive activities and interests may make for intellectual and moral progress. Good teaching expects and adapts itself to wide individual differences in original nature."[1]

The most general modification which can be proposed is that the methods should include more *bodily* activity on the part of the pupils than has been the case in most schools up to the present time. For there is no doubt that the tendency to bodily movement is much stronger in the young than the impulse to follow trains of thought. Early childhood, indeed, is the time for obtaining by means of bodily activity a large amount of perceptual experience, the results and traces of which form the basis of the more purely intellectual activity of later life.

It is, further, to be observed that attention is *always* supported by bodily movement. Even in reflection on the most abstract subjects, there is some activity in the muscles (contraction of the brows, slight movements of the organs of speech, and often more or less definite habitual motion of one or more of the limbs). Some, indeed, cannot think deeply unless they are making very definite bodily movements, more or less in harmony with their thoughts, *e.g.* writing down sentences or sketching diagrammatic representations of their schemes of thought. And if this is the case with many adults, how much more is it necessary with young children, who have a still greater propensity for bodily movement! Hence it is important, even apart from the necessity of approaching much of the early school work in the "play" spirit, to see that a great deal of manual activity is interwoven with the more purely intellectual work. And the more closely it is connected with that intellectual work, the more readily will it support the attention to the ideas in question. A child, for instance, who is in the early stages of reading, will attend to the printed words more closely when he is required to sort out

[1] Thorndike, *The Principles of Teaching*, p. 34.

those words (printed on slips of paper) in order to form certain sentences. For he cannot carry out his manual occupation correctly without close attention to the words in question. A boy who undertakes the weighing and measuring of various articles is certain to appreciate the weights and measures involved more definitely than one who merely looks on, and still more than another who merely listens to a verbal explanation of the different values.

But even apart from bodily movement, *i.e.* in the field of intelligence itself, we can still speak of *doing*. Children have a general tendency to *mental* as well as to *bodily* activity, though, as we have seen, it is difficult to separate the two. And it is important to ensure that they really have something to engage their thoughts. Often the teacher grinds over old ideas which excite little intellectual activity. Or he goes to the other extreme of plunging the pupils into new fields of ideas for which they are not prepared by their previously acquired knowledge, and with which they can consequently "*do*" little or nothing. If only he can hit the proper mean between the known and the unknown, the teacher is almost certain to obtain the co-operation of his pupils in the work proposed. For their naturally active minds will, in default of other attractions, set to work on anything which provides real opportunities for progressive thought. The process of understanding may be fairly difficult, but, if it goes forward successfully it is distinctly pleasurable, and the pleasure produced awakens further conation to reinforce the activity.

(6) The last remark reminds us once again of the most general tendency of all—*the tendency to seek pleasure and to avoid pain.* Professor Thorndike in one place[1] includes this among the instinctive tendencies, as if it were co-ordinate with them. But it is of such generality, entering as it does into all mental processes, and tending to further or to inhibit them according as pleasure or pain is produced, that we must consider it not as a tendency which may or may not be in operation at a given moment, but rather as a condition affecting all mental activity. We have already

[1] Thorndike, *Elements of Psychology*, pp. 309, 310.

seen in the last chapter that it is the basis of the Law of Hedonic Selection, and we have also observed how it is utilised in reward and punishment as a means of aiding in the formation of good habits, where the more special tendencies are insufficient to support such growths. At the same time we have noted that this general tendency is not to be used in this way as a satisfactory means of creating good habits *by itself*. We should use it *as an aid* when other tendencies are not strong enough. But we must ensure that some of those other tendencies will ultimately be modified and strengthened so that they form a secure basis for the good habits in question. If we do not do this, those habits will be in danger of breaking down when the time comes for ceasing the artificial production of pleasure and pain in the form of reward and punishment; in other words, we shall fail to bring about the development of a *self-governing* adult.

It must be remembered that, like the other more special tendencies, this general one does not always get its way. It may often be overwhelmed by the influence of some special tendency which is at the moment more powerful; indeed, it is seldom that any line of activity is due entirely to its agency. Thus curiosity, or some other motive, may be so strong that a person may approach and gaze upon the results of a fearful accident, even although the sight is extremely distressing.

It is conceivable—though by no means certain—that in the long course of evolution this general tendency has given rise to all the other (now) innate tendencies and instincts. The Law of Hedonic Selection, the operation of which we can trace during the life of a given individual, modifying the various tendencies which already exist innately, may be of far more extensive influence, *i.e.* it may not only operate during the life of each individual, but it may have gradually evoked and strengthened all the more special tendencies during the countless ages of animal development. Its products, however, have grown so strong under its fostering care that very frequently now (*i.e.* at the present stage of evolution) any one of them may be so powerful as to run counter to it, to overwhelm

it, and thus to obscure its existence. But in the long run all are influenced by its sway.

We have now taken note of the chief instincts and innate tendencies which constitute the mainspring of life. It remains to give some account of the complex ways in which they become organised as development progresses. This will form the subject of the next chapter.

Questions on Chapter XII.

1. What do you understand by the terms *instinct* and *emotion*? What is the relation between the two?

2. Enumerate the principal instincts, and describe one of them.

3. What should be the attitude of the teacher with respect to the instincts of children? Illustrate your answer by dealing fully with one of these instincts.

4. What do you understand by an *innate tendency* as distinguished from an *instinct*?

5. Explain what is meant by the "sympathy of numbers," and indicate what use the teacher should make of it.

6. Define *suggestion* as a mode of imparting truth. In which subjects should it be employed, and in which should it be avoided?

7. Show how the emulation of the boys can be excited and made of service in (*a*) arithmetic and (*b*) physical exercises.

CHAPTER XIII.

THE NATURE AND DEVELOPMENT OF THE SENTIMENTS.

IN the early stages of human life we notice more or less definite instinctive actions and the emotions corresponding to them, as well as various innate tendencies, evoked by different kinds of objects. Thus the young child shows anger when he cannot get or do what he wants, fear when something overwhelmingly strange appears, curiosity when the strange object is not too unfamiliar, imitation and primitive sympathy in connection with the actions and emotional expressions of others.

These more or less distinct tendencies are soon combined in various ways, one single object evoking more than one instinct at the same time. Thus, at the sight of a snake or a toad, the child may show LOATHING, which seems to be a combination of *fear* and *disgust*; at the sight of a tall man riding a horse, he may show ADMIRATION, which is probably a combination of *wonder* and *negative self-feeling*; at the sight of a troop of soldiers dashing along on horseback, he may show AWE, which is *admiration* blended with *fear*.

Such combinations of instincts are connected with more ideational processes as the child grows wiser. Thus, *loathing* may be evoked by the mean conduct of another boy, *admiration* by the sight of an acrobatic performance, *awe* in the presence of the headmaster of the school.

But certain objects which frequently excite one or more emotions become so closely associated with them that directly they are presented, or even when the image or idea of them occurs, they throw the mind into the emotional attitude in question. The object becomes the

centre of an emotion, or of a system of emotions. Such an organised system of emotional tendencies is called a *sentiment*. A sentiment may begin its life in a very simple form, consisting merely of one emotional disposition connected with a given object. But in many cases other emotional dispositions, more or less definitely connected with the first, grow up around the object or its idea, and constitute a more complex sentiment.

Suppose that a child is placed under a violent-tempered teacher, who is unsympathetic and indifferent to the child, and who is constantly threatening, scolding, and perhaps beating him. At first the child is thrown into a distinct state of fear at each violent act or speech of the teacher. But repetition soon creates a *habit* of fear, so that whenever the child sees the teacher, or even thinks of him, he becomes timorous, although there may be no *present* reason for fear.

A simple sentiment such as this will readily develop, incorporating or becoming associated with other emotional dispositions. Thus the child's *anger* may be frequently evoked by the harsh punishments and restrictions of the unsympathetic teacher. Disgust and the spirit of revenge may soon follow. These various dispositions become more and more intimately connected with the object, which tends to excite them all at once, or in turn, whenever it is presented, either in reality or as an idea. The rudimentary sentiment of fear of the teacher has developed into the full-blown sentiment of *hatred* of that individual.

It is obvious that similar sentiments may grow up about the ideas of other individuals or institutions. Thus some children develop an intense hatred of school, or of some particular branch of school activity. Sometimes this sentiment originates with the teacher, in the way already described, and spreads over to the subjects and to the institution in general; sometimes its origin is rather the way in which the subjects are taught, and the general organisation of the school, which is badly adapted to the child's nature.

In a similar way, an act of kindness by the teacher to the child may arouse *gratitude*. This seems to be a com-

bination of tender-emotion and negative self-feeling, the former being evoked in the child by primary sympathy (for the *teacher* is the first to show the tender emotion, while the child responds sympathetically). This is merely a complex emotion, and may occur only once. But, if the teacher repeats his kindly acts, the gratitude of the child may become habitual, and may come to constitute an emotional disposition always ready to be excited by the presence or by the idea of the teacher Further, other instinctive tendencies may be aroused in connection with the object. The child's tender emotion may lead him to bring the teacher flowers, or to offer him some service. He takes pride in doing these things, his instinct of self-display is awakened, and a permanent disposition to seek the approbation of his teacher may develop. His deep interest in his teacher may involve imitation of his acts where this is possible, sympathy with his emotions, and a high suggestibility to the ideas which he communicates. There may thus grow up in the child a complex sentiment—a system of ideas and impulses usually known as *love*. Such a sentiment as this, modified by other elements, and variously adapted to the different circumstances, may develop in connection with other objects and institutions.

The sympathy aroused between the teacher and the child in the instance just examined is of a higher order than the primitive sympathy on which it is based. Each party not only tends to experience the emotions displayed by the other, but has a craving for the other to share his own emotions. This more complex relation is called by McDougall *active sympathy*. It reaches its most complete form in affection between equals. Only in so far as the child becomes a friend of the teacher is it highly developed.

This sharing of emotions by another individual seems to increase them. There is action and reaction. But painful emotions are intensified in this way as well as pleasurable ones. And it seems difficult to account for this craving for active sympathy in all cases. McDougall thinks it is due to the *gregarious instinct*, which supplements each of the special instincts, being aroused with

them and rendering complete satisfaction of their impulses impossible unless the individual is surrounded by others in a similar state of excitement. An animal in fear runs to join the herd before making off in flight. He feels a tendency to share his emotion with others. The gregarious instinct thus leads to the development of active sympathy from the simpler primitive form already examined.

If this account is correct, active sympathy is quite distinct from the tender emotion. The latter is altruistic; the former is egoistic. Some children exhibit this craving for active sympathy in a pronounced form. They cannot enjoy things by themselves. They are always calling upon others to share their emotions. "Oh, come and look!" is their constant cry when anything excites them. Other children (in whom the gregarious instinct is weak) are content to amuse themselves and suffer their trials in comparative seclusion. These may be very affectionate to those in close contact with them, and they may experience strong emotions of other kinds, but they are not drawn to active interaction with many others. A very good example from adult life is "the old woman on Snowdon in the delightful story told by Mr. Rowley. Mr. Watts Dunton, who was ascending Snowdon, overtook her. She was smoking a short cutty pipe, and took no notice of her companion's eloquent gushes at the sublimities around them. At length Mr. Watts Dunton said, 'You don't seem to care for this magnificent scenery.' Her reply was: 'I enjies it; I don't jabber.'"[1]

Those who become leaders, both among children and among men, have usually a pronounced tendency to active sympathy. He who has it not, or in whom it has become specialised, so as to be aroused only by a few intimate friends, is not likely to become a leader.

We have now considered a few types of sentiment, and we have seen that a large number may be included under the general terms *love* and *hate*, though the particular constitution of any given case may be variously modified.

[1] C. Lewis Hind, Review of *Fifty Years of Work without Wages* in the *Daily Chronicle*, Dec. 7th, 1911.

The two terms we have used characterise only the general features of many sentiments, *i.e.* a large number are cases in which tender emotion is the chief factor, manifesting itself in love, liking, affection or attachment, while a great many others are cases in which aversion (fear or disgust) is the dominant element, hate and dislike being the usual terms applied. McDougall refers to a third general class in which the self-feeling plays the principal rôle and which may be subsumed under the general name of *respect.* Space will not permit an analysis of these here.

But it should be noted that we may classify the sentiments not only with respect to the dominant emotional dispositions which enter into their composition, but with respect to the objects on which they are centred, or around which they are organised. Thus, the same kind of sentiment (e.g. *love*) may be associated with objects of varying complexity. For instance, we get love centred on—

(i) *The concrete particular, e.g.* love for a child.

(ii) *The concrete general, e.g.* love for children in general.

(iii) *The more completely abstract, e.g.* love for justice or virtue.

On the development of the sentiments depends to a large extent not only the direction of conation, *i.e.* what the individual will attend to and what he will do, but also, to a large extent, the feeling which he will experience, or, to put it in another way, his affective life. We have seen that a great deal of hedonic-tone is "tendency-derived," that is to say, much of our pleasure depends upon the fact that our conations are successful, and much of our pain is due to the obstruction of our conations. It is, therefore, a matter of great importance what systems of conations become developed and organised. But, in addition, "each primary emotion seems to have a certain intrinsic feeling-tone, just as the sensations that are synthesised in perception have their feeling-tone, independently of the success, or lack of success, of the perceptual conation. And the intrinsic feeling-tone seems to follow the same rule as that of sensations, namely, that with increase of intensity of the emotion pleasant tends to give way to un-

pleasant feeling-tone; so that, while at moderate intensities some are pleasant and others unpleasant, at the highest intensity all alike become unpleasant or painful; and, perhaps, at the lowest intensity all are pleasant. . . . Thus fear at low intensity does but add a pleasurable zest to any pursuit, as we see especially clearly in children, sportsmen, and adventurous spirits generally; whereas at high intensity it is the most horrible of all experiences."[1]

When we come to consider the complex organisation of a sentiment, we find that the pleasure-pain produced is not due merely to the working of one instinct, but to a large number of emotional dispositions intricately related. The total pleasure or pain produced seems to be of a higher kind, and is often spoken of as *joy* or *sorrow*. If, however, we could separate the feeling from the complex circumstances which give rise to it, we should probably have to recognise it as the same thing as that due to lower and more simple processes. *Joy* and *sorrow*, therefore, are not to be regarded as emotions. They are aspects of complex states due to the existence of sentiments which include many of the emotions already described, and which involve much pleasure or pain in connection with the manner of their excitation. Just as we often extend the meaning of the word *pleasure* or *pain* from the hedonic tone of a state to the whole state of which it is an aspect, so we sometimes specialise the meaning of *joy* or *sorrow* from the whole complex of emotional excitement involved in the activity of a sentiment to the hedonic aspect of that state. It is perhaps best to keep these terms *joy* or *sorrow* for the whole complexes of emotion, recognising, however, that the former implies a state which is pleasurable as a whole (though certain strands or elements may be painful), and the latter a state which is largely painful (though certain portions of the experience may be pleasurable).

A similar difficulty arises in connection with the meaning of the words *happiness* and *unhappiness*. Some writers of distinction have identified them with *pleasure* and *pain* respectively. And many humbler individuals

[1] McDougall, *op. cit.*, pp. 149, 150.

have accepted the identification. When, therefore, it is maintained, as, for instance, by Socrates, that the virtuous man alone is truly happy, there is considerable difficulty in accepting the statement. Many feel that it *ought* to be so, but they are convinced that in practice it is frequently otherwise. We often witness the spectacle of a good man struggling with adversity, afflicted with many trials and sorrows, while, on the other hand, we see many wicked people enjoying luxury and ease. We may be told that the latter individuals are not in a state of pleasure. But it is sometimes hard to believe the assertion. How, then, can the apparent paradox be explained?

Pleasure and pain are produced not only in connection with elementary processes of sensation, with the more complex processes of perception and of simple emotions, and with the still more complex processes involved in the activity of a sentiment, but also in connection with the harmonious or unharmonious working of the whole system of sentiments. As the individual progresses in life, the sentiments tend to become organised among themselves into some harmonious system or hierarchy. If they do not, there is danger of continual conflict. Two or more partially opposed sentiments are excited together, and since there is no principle of harmony, there is strife between them. This involves pain. And it involves a great deal of pain because of the deeply rooted and complex nature of the organisations between which strife occurs.

To use an analogy from the constitution of the State, it is a serious matter if two citizens quarrel, it is still more serious if two towns disagree, but it is a terrible thing if the various provinces, or the different classes of the community, are at cross purposes. The solution of the difficulty within the State is that all sections of the community, while pursuing different subordinate ends, shall be actuated by a common and dominant purpose, strong enough to render all serious strife impossible. We see this remedy at its best whenever some great national purpose grips the whole of the community. When, for instance, the nation is attacked from without, all parties work together in defence of the fatherland. But under ordinary cir-

cumstances there is usually a good deal of unpleasant friction between man and man, and between section and section, of the community. The amount of this measures the weakness of the nation. The reduction of it implies the strengthening of the State. At the same time the country becomes a pleasant place to live in. And this in spite of the many minor trials and troubles which must arise on account of the action of nature and the imperfection of man's methods of dealing with it.

Plato in his *Republic* suggests that this harmonious condition can only be attained, under the ordinary conditions of life, when one class or section becomes dominant, subordinating and ruling all the others. He believes that the ideal State is one in which a class of philosopher-kings is created. These men have the welfare of the State as their supreme end, and they co-operate by their wisdom in ordering all the lower sections, so that, while there is still diversity of occupation, there is an underlying unanimity of aim. "Unless it happen," he says, "either that philosophers acquire the kingly power in States, or that those who are now called kings and potentates be imbued with a sufficient measure of genuine philosophy, that is to say, unless political power and philosophy be united in the same person, most of those minds which at present pursue one to the exclusion of the other being peremptorily debarred from either, there will be no deliverance, my dear Glaucon, for cities, nor yet, I believe, for the human race."[1]

Now to what do these two types, kings and philosophers, who ought, according to Plato, to be the same persons, correspond in the human mind? The king is the person in the State who has most power. And he corresponds to the ruling sentiment in the mind. The philosopher is the person who loves wisdom, who acts calmly and wisely. And he corresponds to the higher intellectual and moral faculties of the mind, especially in so far as they are concerned with ideals of conduct. If, then, we apply the analogy to the constitution of character, we must say that

[1] Plato, *The Republic*, Book V.

in the ideal state of mind there is not only a dominant sentiment, but that sentiment is suffused with moral wisdom.

The dominant sentiment in the mind, in normal cases at any rate, is the *self-regarding sentiment*, the system of emotions and desires which grows up and becomes organised about the idea of self and all appertaining to it. *Some form of this sentiment is destined to rule in the mind.* But it can only establish harmonious government under three conditions—it must be extended and developed in close connection with the altruistic sentiments, enlightened and refined by the criticism which arises as the intelligence grows and reaches the higher planes, strengthened and vivified by the self-control which matures as habits of choosing the right course become firmly established. When thus developed it becomes "the master sentiment among all the moral sentiments, the sentiment for a perfected or completely moral life. If a man acquires this sentiment, he will aim at the realisation of such a life for all men as far as possible; but, since he has more control over his own life than over the lives of others, he will naturally aim at the perfection of his own life in the first place. In this sentiment, then, the altruistic and egoistic emotions and sentiments may find some sort of reconciliation; that is to say, they may become synthesised in the larger sentiment of love for an ideal of conduct, the realisation of which involves a due proportion of self-regarding and of altruistic action; and the desire for the realisation of this ideal may become the master motive to which all the abstract sentiments lend whatever force they have."[1]

This transformation of the self-regarding sentiment into a moral purpose pervading the whole of life is symbolised in the Christian Church by such expressions as "giving oneself to God." In its completeness it can only be attained gradually. But, under the influence of special circumstances, great crises may occur, involving totally new orientations of desire and action. These are usually known

[1] McDougall, *op. cit.*, pp. 226, 227.

as *conversions*. They are victories of the self-regarding sentiment over the narrow limitations imposed by the predominance of the lower and more egoistic instincts. And most Christians will admit that they must be confirmed and extended by long periods of activity in the new direction, thus grounding the moralised sentiment on the firm rock of habit. If this process does not take place, there is imminent danger of backsliding.

Only when this dominance of a strong moralised self-regarding sentiment is secured can there be a state of life which can be described as *happiness*. This peace "which passeth all understanding" is to a large extent independent of the pains and pleasures involved in the fleeting forms of experience. It justifies the assertion that the good man is happy, even in adversity. "In the child or in the adult of imperfectly developed and unified personality, the pleasure or pain of the moment is apt to fill or dominate the whole of consciousness as a simple wave of feeling, whereas in the perfected personality it appears as a mere ripple on the surface of a strong tide that sets steadily in one direction."[1]

The word *happiness*, then, must not be lightly identified with *pleasure*. It implies that harmonious conduct of life which can only be attained when all the sentiments have been organised and placed under the sway of a highly moralised and widely extended self-regarding sentiment. If we wish to specialise the meaning of the word to denote pleasure, it can only be applied to that permanent pleasure which accompanies the smooth working of the complicated system of conations involved in the perfected character. This pleasure is, by the nature of its conditions, enduring. And though it may be partially obscured by the pain of the passing moment, it can never be finally extinguished. In the long run, therefore, it is greater in amount than that which can be derived from any other source. "Hence, so long as the whole soul follows the guidance of the wisdom-loving element without any dissension, each part can not only do its own proper work in all respects, or in other

[1] McDougall, *op. cit.*, p. 157.

words be just; but, moreover, it can enjoy its own proper pleasures in the best and truest shape possible."[1]

From this point of view we are able to reconcile two schools of moral philosphy which have often been regarded as diametrically opposed. On the one hand the *Hedonists* have preached that pleasure is the end of life. On the other, a school of thinkers whom we may call "*Perfectionists*" have maintained that virtue is the *summum bonum*. We have seen that the condition of mind which involves the highest moral perfection of which man is capable is at the same time the source of the most enduring pleasure. Epicurus, one of the earliest of hedonistic philosophers, came very near to this position when he maintained that, though pleasure is the end, it can only be attained to the fullest extent by a life of virtue. Unfortunately many of the later Epicureans brought the name of their master into disrepute by adopting the end while neglecting the means. They sought the sensual pleasures of the moment, and failed to aspire to the permanent and enduring pleasure which is an unfailing accompaniment of the virtuous life.

The parent and teacher cannot hope to produce in the child the ripe fruit of a perfect character. They can, however, do a great deal in laying the foundations on which the beautiful structure will afterwards be reared by the child's own exertions. They can, in the first place, do much to modify the growth and development of the instincts out of which the sentiments are gradually built up. Some require suppression, some encouragement; while others must be turned into different channels. We have already noted some of the ways in which the instincts and innate tendencies can be dealt with.

This work cannot be separated from the building up of the sentiments. We do not first get the right proportion and strength of elementary tendencies, and then organise them around certain objects. We are continually developing or repressing certain tendencies in connection with the process of organising a sentiment. Take, for instance, the self-regarding sentiment, which we have already found

[1] Plato, *The Republic*, Book IX.

to be the most important. In its early stages of development, this is apt to be compounded of instincts and emotions which have an egoistic bias. The instincts of pugnacity and self-assertion, compounded with such others of less well-defined emotional tendency as those of feeding, acquisition, manipulation, and constructiveness, are its predominant features. To make it more altruistic we require to incorporate in it such tendencies as lead the child to a fuller realisation of himself as a social being, dependent on the love and approval of those around him. If such instincts as pugnacity and self-assertion are allowed to continue as the most dominant elements which operate in this sentiment, an unlovely combination of self-will and pride will be developed. Hence the need of the exercise of authority over the child.

The modern reaction against the unbending authority of the past has overshot the mark. We have been so often bidden to respect the natural tendencies of the child that there is now a real danger of their being allowed to grow up at random, like weeds in a garden. But without the strong intervention of authority, some of the child's natural tendencies would not be called forth at all. It must be remembered that fear and submission are just as natural to the child as anger and self-display. The former, however, will not be called out to any large extent under modern conditions of life unless authority grips the child. True self-respect involves not merely positive self-feeling, but also the corresponding negative phase. "The main condition of the incorporation of this disposition in the self-regarding sentiment is the exercise of authority over the child by his elders. At first this authority necessarily demonstrates its superior power by means of physical force, later by means of rewards and punishments. On each occasion that the exercise of personal authority over the child makes him aware of a superior and inflexible power to which he must submit, his negative self-feeling is evoked; then his idea of self in relation to that person becomes habitually accompanied and suffused by this emotion in however slight a degree, and he habitually assumes towards that person the attitude of submission.

Thus the disposition of this emotion becomes incorporated in the self-regarding sentiment."[1]

From the psychological point of view, rewards and punishments are most complex in their functions. They imply, first, pleasure and pain respectively. This pleasure-pain may be "tendency-derived" or "intrinsic." If I allow a boy as a reward to go out and play a game of football, I give him pleasure by allowing one of his tendencies free exercise. If, on the other hand, I put him by himself away from the other children, I am causing pain by checking a tendency—that of the gregarious instinct. When the infants' teacher gives a child a sweet, the pleasure derived seems to be largely "intrinsic." If she gives him a smack, some at least of the pain is "intrinsic."

The effects of the pleasure-pain, in whichever of the two ways it is obtained, are, as we have seen in a former chapter,[2] of two kinds. In so far as the rewards and punishments are so closely associated or bound up with the activities leading up to them that there is no separation in thought (as is the case with young babies), the pleasure-pain acts directly, by encouraging or weakening the tendencies to those activities. In so far as the rewards and punishments are distinguished from the activities leading up to them, though possibly (*certainly*, indeed, where they are *regularly* given) inevitably connected with them in thought, they act, when the ideas of them arise, by awakening distinct conations—*an appetitive impulse* in the case of reward, tending to obtain its satisfaction by means of the line of activity in question, *an aversive impulse* in the case of punishment, tending to avoidance of the activity in question.

But these are not the only ways in which rewards and punishments act. As soon as they rise to the second level above indicated, the level at which the child can call up distinct ideas of them and has separate conations connected with them, the level, therefore, on which they are most correctly to be described as rewards and punishments, they exert further influences. For when the young

[1] McDougall, *op. cit.*, p. 194. [2] Pp. 240 ff.

child has become sufficiently intelligent to distinguish them from the activities which bring them upon him, he is also intelligent enough to distinguish himself from other similar selves. His social consciousness is developing. He is beginning to recognise that he is a unit intimately related with, and depending for his welfare upon, other units, many of whom are vastly more powerful than himself, and the whole of whom constitutes a most important part of the total environment with which he has to struggle. It goes without saying that these thoughts are not clear and definite in his mind. Only philosophers state them in this definite way. But all who are able to conduct themselves decently in society show *ipso facto* that they must have these ideas in their minds, though usually in the background.

Now rewards and punishments do much to generate an adequate idea of the self as related to others, and to develop a satisfactory system of emotions and conations, organised about that idea and constituting with it the self-regarding sentiment. Rewards, in addition to the effects previously noticed, indicate to the child in very "tangible" fashion that the big people to whom he is learning to look up are pleased with him. They minister specially to his self-feeling (both positive and negative) and to his craving for sympathy. He is elated by the consciousness of having done something to distinguish himself. At the same time his attitude is not entirely that of self-display: it implies a recognition of superior persons capable of distributing reward, and hence involves some amount of subjection. Finally, he feels himself in harmony with his social environment, and gains much pleasure by the sympathic reaction between it and himself. In such ways as this, the rewards bestowed on the child extend and enrich his self-regarding sentiment. At the same time, and in connection with the same processes, the further pleasures and pains involved in this higher phase of self-consciousness contribute effects similar to those produced on the lower plane already described. The child is thereby encouraged to continue to act in the ways which have led to these rewards.

Thus the disposition of this emotion becomes incorporated in the self-regarding sentiment."[1]

From the psychological point of view, rewards and punishments are most complex in their functions. They imply, first, pleasure and pain respectively. This pleasure-pain may be "tendency-derived" or "intrinsic." If I allow a boy as a reward to go out and play a game of football, I give him pleasure by allowing one of his tendencies free exercise. If, on the other hand, I put him by himself away from the other children, I am causing pain by checking a tendency—that of the gregarious instinct. When the infants' teacher gives a child a sweet, the pleasure derived seems to be largely "intrinsic." If she gives him a smack, some at least of the pain is "intrinsic."

The effects of the pleasure-pain, in whichever of the two ways it is obtained, are, as we have seen in a former chapter,[2] of two kinds. In so far as the rewards and punishments are so closely associated or bound up with the activities leading up to them that there is no separation in thought (as is the case with young babies), the pleasure-pain acts directly, by encouraging or weakening the tendencies to those activities. In so far as the rewards and punishments are distinguished from the activities leading up to them, though possibly (*certainly*, indeed, where they are *regularly* given) inevitably connected with them in thought, they act, when the ideas of them arise, by awakening distinct conations—*an appetitive impulse* in the case of reward, tending to obtain its satisfaction by means of the line of activity in question, *an aversive impulse* in the case of punishment, tending to avoidance of the activity in question.

But these are not the only ways in which rewards and punishments act. As soon as they rise to the second level above indicated, the level at which the child can call up distinct ideas of them and has separate conations connected with them, the level, therefore, on which they are most correctly to be described as rewards and punishments, they exert further influences. For when the young

[1] McDougall, *op. cit.*, p. 194. [2] Pp. 240 ff.

child has become sufficiently intelligent to distinguish them from the activities which bring them upon him, he is also intelligent enough to distinguish himself from other similar selves. His social consciousness is developing. He is beginning to recognise that he is a unit intimately related with, and depending for his welfare upon, other units, many of whom are vastly more powerful than himself, and the whole of whom constitutes a most important part of the total environment with which he has to struggle. It goes without saying that these thoughts are not clear and definite in his mind. Only philosophers state them in this definite way. But all who are able to conduct themselves decently in society show *ipso facto* that they must have these ideas in their minds, though usually in the background.

Now rewards and punishments do much to generate an adequate idea of the self as related to others, and to develop a satisfactory system of emotions and conations, organised about that idea and constituting with it the self-regarding sentiment. Rewards, in addition to the effects previously noticed, indicate to the child in very "tangible" fashion that the big people to whom he is learning to look up are pleased with him. They minister specially to his self-feeling (both positive and negative) and to his craving for sympathy. He is elated by the consciousness of having done something to distinguish himself. At the same time his attitude is not entirely that of self-display: it implies a recognition of superior persons capable of distributing reward, and hence involves some amount of subjection. Finally, he feels himself in harmony with his social environment, and gains much pleasure by the sympathic reaction between it and himself. In such ways as this, the rewards bestowed on the child extend and enrich his self-regarding sentiment. At the same time, and in connection with the same processes, the further pleasures and pains involved in this higher phase of self-consciousness contribute effects similar to those produced on the lower plane already described. The child is thereby encouraged to continue to act in the ways which have led to these rewards.

Punishments play a corresponding and complementary rôle. They indicate to the child that the big people to whom he looks up are displeased with him. He feels that he is out of joint with his social environment. His craving for sympathy is obstructed. His positive self-feeling is wounded. The pain involved in these processes is added to the intrinsic pain of the punishment itself and augments its influence on the lower plane already described. Under normal circumstances, when the punishment produces the desired effect, the child's negative self-feeling is strongly aroused. This is the only instinct which can under the circumstances have free play. We accordingly find that the child is ready to submit himself to his superiors.

Rewards and punishments, then, besides their direct action on tendencies, play a most important part in the development of the self-regarding sentiment as a whole. To speak broadly, they ensure a due recognition of the claims of others upon the individual, thus encouraging a more altruistic outlook. In those children in whom such an outlook, with its corresponding tendencies, is already well developed, the need of definite rewards and punishments is not so great. But in most cases, some amount of both is necessary—at any rate in the early stages. With many individuals they constitute a most important factor throughout life.

But usually rewards and punishments may, very early in life, give place, to a large extent, to praise and blame. There is, indeed, a very intimate connection between these two methods of treatment. On the one hand, praise and blame, being frequently used in conjunction with rewards and punishments, are ever tending to call up ideas of them, and thus to borrow some efficacy from them. Blame, especially, tends to call up the apprehension of possible punishment. On the other hand, the higher kind of influence exerted by rewards and punishments is, as we have just seen, of the same nature as that of praise and blame.

Such rewards and punishments as good and bad marks seem to constitute an intermediate stage between rewards

and punishments proper, and "mere" praise and blame. Marks owe their power both to the consequences, pleasant or painful, to which they lead (the teacher must see that they *do* lead to consequences) and to the distinction, enviable or unenviable, which their very conferment entails.

It is sometimes said that praise and blame *are* rewards and punishments to children, to those, namely, in whom the self-regarding sentiment has already attained some degree of complexity. This is only a question of terminology. They may, if we choose, be called rewards and punishments in which all the pleasures caused and the wounds inflicted occur within the domain of the self-regarding sentiment. But it seems best to reserve the names *reward* and *punishment* for those methods which involve the causing of pleasure-pain in other ways, *i.e.* in addition to that which may also arise concomitantly within the system of the self-regarding sentiment, and which is due to the consciousness of the approval or disapproval of one's superiors.

In praise and blame, then, approval and disapproval are shown without any accompanying infliction of pleasure or pain by other means. It is obvious that these higher methods of treatment can only have their full effect when the self-regarding sentiment has already become fairly well developed. When that is the case, they cause an amount of pleasure-pain which is often far greater than that due to the cruder methods of reward and punishment (especially if these be considered only with regard to their action on the lower plane). A highly sensitive child may be more deeply hurt by a reproachful look from his teacher than a child of cruder nature would be by a thrashing. The pleasure-pain caused by praise and blame has thus the same encouraging or discouraging effects as the cruder forms of reward and punishment. It is, indeed, often more efficacious, on account of its greater intensity. At the same time, the self-regarding sentiment is continually extending and developing under the influence of this approval and disapproval. Here, too, the influence of praise and blame is usually greater than that of reward and punishment. The latter methods, if abused, tend to a

narrowing of the self-regarding sentiment. But praise and blame, though they may have a similar effect when excessively employed, may be judiciously used in great freedom without leading to a similar contraction.

There is little doubt that praise and blame have been somewhat neglected in the past by most teachers. One reason for this has been the great uncertainty with respect to the amount of pleasure or pain aroused in any given case. We have already seen that this depends on the state of development of the self-regarding sentiment. The cruder rewards and punishments have, therefore, been frequently abused. For the teacher can always be sure of causing some amount of pleasure-pain by these means, though the amount often varies from one child to another far more than he suspects.

Praise, especially, is neglected by a large number of teachers. It is sometimes thought that the use of it is an evidence of weakness both in teacher and child. But if we reflect that most adults—some would say *all*—owe much inspiration for their work to the thought of the approval and disapproval of their fellows, whether those of their immediate circle, or all their contemporaries, or chiefly posterity, we ought to come to the conclusion that praise is a most important means of encouraging young children to act and think in the best possible way. There are, it is true, some teachers who abuse it, causing it to lose much of its efficacy by too frequent repetition. But perhaps the chief reason why it sometimes fails is that the teacher lacks personality. The praise which comes from a highly respected person is much more esteemed than that which emanates from someone little above ourselves, and when we get it from one who is considered our inferior we often resent it. Hence the need that the teacher shall maintain a high level of thought and deed, so that his pupils cannot fail to look up to him in some respects. The personality of the teacher is the keystone of his moral influence on his boys.

Though the "moral suasion" of praise and blame, in all the forms which they may take, can be made to assume a large place in the control and development of children,

it must once more be repeated that this can only occur when a certain level has already been reached. Rewards and punishments are usually necessary in laying the foundations, and they are also necessary as supplementary to the higher methods. In most elementary schools in the poor districts of great towns, there are some children in whom the self-regarding sentiment is a very mean and limited organisation. With these the more direct methods of reward and punishment have often to be more widely employed.

It has already been noted that a sentiment is a complex disposition to feel, think and act in certain ways, organised about some central object or idea. As the sentiment develops, this object or idea becomes more complex. As, for instance, the self-regarding sentiment develops, one's knowledge of oneself, and of all the relations into which one can enter, increases. In other words, moral development implies increase in knowledge. We have already noted in an earlier chapter that knowledge is a necessity for right conduct, and that much knowledge is necessary where the conduct is complex. Now in this field, as well as in all other fields of knowledge, we cannot leave the child to find out everything for himself in the course of his individual experience. As soon as he has made a start in the way of first-hand acquaintance, we should enlarge his views by telling him more than he could ever discover if he was confined to the limits of his own life.

This is the opportunity for *moral instruction.* Such teaching never supersedes first-hand acquaintance with the facts of life; it must, indeed, be based upon that. It can usually take the form of stories vividly told, without too great insistence on the moral implied. But if the children do not feel the force of the stories, no mere intellectual insistence on the moral will help them. If stories are to quicken the moral insight of the children, there must already be some of the sentiment expressed by them in the nature of the children. The beginning must have been laid in practical experience. The ideas aroused, whether by story or by direct precept, are of little value considered solely on their intellectual side. They must

arouse emotions and impulses to action. Seeing that moral instruction, as such, cannot ensure the existence of the appropriate sentiments, some educationists have questioned its utility. There seems little doubt, however, that when once a groundwork of rudimentary sentiments has been laid, some amount of moral instruction should be given, either incidentally, in connection with such subjects as scripture, history, and literature, or systematically, in lessons specially arranged for the purpose. It extends the child's horizon beyond the narrow confines of his own experience, and it stimulates and enriches the moral sentiments which already exist.

It is, however, possible to have a moral sentiment highly developed, and yet to find that the conduct in harmony with it does not occur. "Hell," it is said, "is paved with good intentions." This is a further argument for those who belittle the value of moral instruction, as such. It certainly does point to the need of something more. It reminds us that the silent force of habit should be behind the other powers we have examined. The teacher, in his use of reward and punishment, and of praise and blame, should have constantly in mind the necessity of securing unfailing repetition of the actions he desires. In a large number of cases, the sentiments, with their emotions and tendencies, can be aroused to the support of those actions. But often the need for a certain action arises when the corresponding emotions are not at white heat. The world does not always present us with our hardest tasks when we are in the most favourable attitude of mind to attack them. If we are not to fail at such moments of trial, we must have formed fixed habits of action under more favourable circumstances. Habit itself, when firmly fixed, is a conative force.

The moral sentiments, therefore, must not only be founded on strong instinctive tendencies and enlightened by far-reaching knowledge, they must be rendered stable and continuous by the development of a strong system of habits. It is possible, by crude methods of reward and punishment alone, to manufacture habits which do not correspond to, or form part of, any definite sentiment or

disposition. These may have some stability. And if there is nothing to counteract them, they are likely to go on after our control is removed. But if they are in opposition, to any sentiments or dispositions, they will quickly disappear when the child comes to rule himself. By all means, then, let us try to shape habits. But let us try also to develop sentiments in harmony with them. Either alone will be in danger of failing. Together they will form the rock on which character is built.

QUESTIONS ON CHAPTER XIII.

1. Explain fully what is meant by the term *sentiment.*

2. Examine the meaning of the terms *happiness*, *joy*, and *pleasure*, showing in what they are alike, in what they differ.

3. *Punishment* in its widest sense has three kinds of influence. State these as clearly as you can. To which of the three does the word *punishment* used in its narrowest sense most particularly belong?

4. Show that *rewards* and *punishments* are necessary in most cases to the building up of an adequate self-regarding sentiment.

5. Examine the influence of *praise* and *blame* on the development of the child.

6. Why is it inadvisable to have a fixed system of pains and penalties for various breaches of discipline?

7. Bring out the importance of *habit* as a factor in producing moral conduct. Point out also its limitations.

8. How can *moral instruction* improve the character of a child? Point out its limitations.

CHAPTER XIV.

The Will.

For the benefit of those who will plunge into other psychological text-books, it is well to make clear the different meanings which have been assigned to the word *will*.

Some writers make it synonymous with conation. Now *all* writers imply conation when they use the term will, but many restrict its meaning to certain forms of conation. It is obvious that we can begin with the wide meaning (conation) and gradually proceed up the scale, narrowing the meaning to higher and less numerous forms of conation. We can consequently say—All cases of *will* (whatever be the exact meaning of a writer) are cases of *conation*. But it is only when we adopt the widest meaning that we can say—All cases of *conation* are cases of *will*.

Some writers use the word *will* for all those conations which are expressed by bodily movements, and which also involve ideas of those movements. Thus, the sight of the poker may suggest to me the idea of poking the fire, and the nervous impulse accompanying the conative energy of this idea may discharge into the actual movement, of which, of course, I am immediately made aware by means of resulting sensations. The whole mechanism, on the psychical side, as well as on the physiological, may be quite automatic. It proceeds like a reflex action, or like a purely instinctive action. It is evidently based on associations already formed in past experience, and partakes of the nature of habit. Now habits require consciousness in the early stages, but involve less and less conscious attention as they become fixed. They work, if there

is nothing to oppose them, like reflex or instinctive processes. They have often, therefore, been called *secondarily-automatic*, to distinguish them from those processes like reflex actions and instinctive actions which, at any rate so far as a given individual is concerned, are *primarily-automatic*. Such movements as occur at the mere arousal of the idea of them are called *ideo-motor* movements. They occur very frequently with all of us, but most frequently with those who have a fund of conative energy which is not drawn off by other ideas, *i.e.* with those in whom few, if any, other ideas are suggested beyond that of the moment. This is pre-eminently the case with the person in a state of hypnosis. He does almost anything which is suggested to him by his hypnotiser.

It should be noted that the higher forms of conation, which we shall presently study, usually involve these simpler ideo-motor actions as their final expression. Thus, when a man signs his name to the most important document with which he has to deal during his life, and does it after long and careful consideration, his action of signing is *ideo-motor*. He requires merely the idea of signing his name to be present in his mind with sufficient force, and without opposing conations of adequate strength to arrest him. This state once obtained, the movements of signature take place automatically, depending, as they do, on a psycho-physical disposition developed in past experience. But this simple act of signature is the concluding part of a larger conative process of a more complex nature, and many writers would refuse to allow the use of the word *will* except in application to the more complex factors.

Some writers use the word *will* to cover all cases in which a conation proceeds with a distinct idea of the end to which it leads. Thus the instinctive actions of a bird building its nest for the first time would not be said to exemplify *will*, if—as most believe—the bird has no idea of the object in view. Instinct is thus said to be blind. But the man who is digging vigorously in the hope of finding gold has a distinct idea of his purpose. Such a state as this, in which there is great conation with a clear idea of the end of that conation, is often called *desire*. It is

obvious that the case of the man signing an important document after careful consideration is one of desire. If the man desired nothing, if he had no object in view, he would not go through the process of reading, reflecting and signing. But this is not a *simple* case of desire. The man, as we have described him, does not merely recognise that signing the document will attain a certain end. He *reflects*. There are other desires in his mind which conflict with this one.

Others, then, go a step further in specialisation of the meaning of the word *will*, and would use it only in cases where there are several desires conflicting, and one of them obtains the victory, the others being suppressed. Thus a boy with a penny may want to obtain both a top and a kite, each of which costs that amount. He has to decide between them. He may hesitate for some time, balancing the two sets of ideas in his mind, and swayed now one way, now the other, by the conations involved. This process is often called *deliberation*. Usually it ends in a definite choice. The boy plunges for one or the other. This is frequently called an act of *will*. Another name often employed is *volition*.

But there is a still higher type of choice. The struggle of desires in the last case is usually settled by the stronger suppressing the weaker. During deliberation one of the two sets of ideas develops stronger conative force than the other. The prospect of possessing a kite and flying it, when reflected upon, awakens a keener desire than that of possessing a top and spinning it. The former, therefore, wins the day. But there seem to be cases in which a weaker desire overcomes a stronger one. The man who, though very fond of wine, refuses to drink because he desires to be temperate, seems to decide in the direction of the weaker motive. Many, at any rate, affirm that they have such experiences. And some psychologists would reserve the term *volition* for the effort made in such extreme cases. Only such cases of moral choice should, according to them, receive the name *volitions* or *efforts of will*.

It is perhaps best to follow these writers, and to use *volition* only for these instances. The term *choice* may be

reserved for such simpler cases as the case of the boy and the kite. As for the word *will*, we shall presently find the most suitable meaning for it. Every man who, after a struggle, succeeds in overcoming a strong temptation can be said to have gone through a process of volition. He appears to have conquered a conation which was stronger than any other at the moment. Usually the stronger conation belongs to a lower plane, the weaker to a more ideational one. "And if a brief definition of ideal or moral action were required, none could be given which would better fit the appearances than this: *It is action in the line of the greatest resistance.*

"The facts may be most briefly symbolised thus, P standing for the propensity, I for the ideal impulse, and E for the effort:

$$I \textit{ per se} < P$$

$$I + E > P."[1]$$

Now the question we have to answer is: Whence comes this effort (E)?

Some psychologists settle the matter by merely calling it an *effort of the will.* And, if pressed to say what they mean by *will*, they give other terms such as the *ego* or the *self.* If, however, this is to be regarded as some *separate entity* "sitting up aloft," which can decide the matter much as a judge decides a case of law, we can only reply that there is no evidence of such a being.

There *is*, however, something which decides the struggle. But it is not a separate entity. It is the *self-regarding sentiment.* If the weaker ideal motive has to stand by itself against the stronger propensity, it succumbs. But if the person can pause for a moment, and can begin to think of himself, of his position in the world, of his aspirations and ambitions, and if these ideas are associated with emotions and impulses of considerable power, the weaker ideal motive will be reinforced. In other words, if a satisfactory self-regarding sentiment has been developed, this will turn the tide of battle. "*The conations, the desires*

[1] James, *Principles of Psychology*, Vol. II., p. 549.

and aversions, arising within this self-regarding sentiment are the motive forces which, adding themselves to the weaker ideal motive in the case of moral effort, enable it to win the mastery over some stronger coarser desire of our primitive animal nature, and to banish from consciousness the idea of the end of this desire."[1]

The effort, then, is due to strife between impulses aroused within the self-regarding sentiment and the powerful conation belonging to a lower sphere. This is the true meaning of *self-control*, the control of the lower impulses by those connected with the self-regarding sentiment. When, therefore, we speak of an effort of *will* we mean an effort produced by the impulses connected with our higher nature, *i.e.* with our self-regarding sentiment. *Will*, then, in this sense, is only another name for the conative forces of the self-regarding sentiment.

If, therefore, highly moral volitions are to take place, there must be an extended and enlightened self-regarding sentiment. But, further, as we have already seen, it must have a strong conative side. There are persons with the most exalted notions of their duty who have unfortunately little conative force involved in those ideas. And even the best of us have our weak moments—moments when, although we know the right, we do not feel any powerful emotions and impulses supporting it. All our sentiments have their times of strength and of weakness. They are more stable than the emotions and desires of which they are compounded, since they are due to repetition of similar experiences, generating certain habits of thought, feeling and action. But they partake of the unstable nature of the emotions and desires. And it is therefore extremely necessary that the element of habit should be strengthened, especially in the case of that great sentiment which plays the predominant rôle. This great sentiment must never, if possible, lose a battle.

As man progresses, he is so impressed with this necessity that he develops, within his self-regarding sentiment, a sub-sentiment—*the sentiment for self-control.* Instead of

[1] McDougall, *op. cit.*, p. 248.

acting chiefly for the sake of the approval and disapproval of those around him, or even of an inner circle of respected friends or leaders, he begins to act with himself as the chief spectator in the "gallery." "Moral advance and the development of volition consist, then, not in the coming into play of factors of a new order, whether called the will or the moral instinct or conscience, but in the development of the self-regarding sentiment and in the improvement or refinement of the 'gallery' before which we display ourselves, the social circle that is capable of evoking in us this impulse of self-display; and this refinement may be continued until the 'gallery' becomes an ideal spectator or group of spectators or, in the last resort, one's own critical self, standing as the representative of such spectators."[1]

It is obvious that we cannot expect to find highly developed cases of volition in children before the self-regarding sentiment has attained some development, *i.e.* before they have acquired some self-consciousness. But some form of self-consciousness develops fairly early in the life of the child. And elementary forms of volition can be noted long before the highest form of moral choice is to be expected. Teachers and parents must be satisfied with these for the time being. Their business is to develop the self-regarding sentiment with respect both to its ideational aspect and to its emotional and impulsive manifestations, so that it may win greater and nobler victories as time proceeds.

The ideational aspect is developed largely by widening experience, in the course of which the child comes into closer and more intricate relations with men and things. He thus grows in the knowledge of himself and of his environment. And it is important to bear in mind that these two spheres of knowledge develop together, and by interaction. In so far as we know other people better, we understand ourselves more adequately; and in understanding ourselves and our relations we necessarily understand better the persons and things outside of us which

[1] McDougall, *op. cit.*, p. 257.

constitute the second terms of each of those relations. As we have already noted, this knowledge of ourselves in our relations to the world can and should be further extended by some form of moral instruction, whether incidental to the instruction in such subjects as scripture, literature, and history, or specially arranged for as a separate subject.

But it must always be remembered that the ideational aspect is of little value if the conative aspect is not also strongly developed. The proper emotions and impulses are of supreme importance. And it is worth while repeating, since the matter is of such moment, that since emotional life is so fluctuating, it is necessary to secure more stability by the careful formation of strong habits. These, however, are of little value unless they are largely in harmony with the emotions and impulses, upon which, indeed, they must to a great extent be based. It is of little use to coerce a boy into habits which are directly opposed to his strongest tendencies. It is better rather to discover what habits can by judicious treatment be formed largely on the basis of those tendencies. Thus, it is futile to force a boy of strong physique, and with pronounced tendencies to bodily activity, to adopt a life of close application to books. But it is possible to lead such a boy to form habits of steady work at some trade or profession involving much manipulation and considerable thought. Nor must we attempt to form habits before the favouring tendencies, together with their ideational accompaniments, have developed. It is not advisable, for instance, to attempt to form a habit of truth-telling in a child of three, whose ideas of his obligations to others in this respect must be very limited, whose distinctions between the real of perception and the unreal of imagery are probably most vague, and whose instinct of self-display may prompt him to talk of many things which have not really happened.

As examples of elementary volitions, with the more or less rudimentary states of the self-regarding sentiment therein involved, we may take the following cases.

1. We noted that rewards and punishments bring home to the child in very definite fashion his relations to some of the superior persons on whom he depends. Suppose a

child, who has been punished for arriving at school late without excuse, is watching some men at work in the road when the school-bell suddenly breaks in upon his hearing. He may be interested in what the men are at the moment doing. But he may also know that, unless he starts off at once, he will certainly be late. The memory of former punishments may arise. Still there may be hesitation for a few moments. If, however, he suddenly decides, "I don't want to be punished, so I'll be off," he has performed an elementary process of volition. His self-regarding sentiment is limited to the idea of himself as liable to punishment, and the impulse which decides the short conflict is largely one of fear, emphasised by the warning tones of the bell.

Another boy, who has seldom been late, and thus never punished, may be in similar circumstances. But he may be trying for a reward card for punctual and regular attendance, and the idea of this may be sufficient to reinforce the warning of the school bell. In this case, the self-regarding sentiment is probably a little more complex. The idea of the reward card may involve the consciousness of himself as a person to be approved. But in both cases the consciousness of self involves little more than the one conation which is aroused to counteract the strong tendency to remain watching the interesting occupations of the workmen. Some would therefore prefer to call these mere cases of *choice* (in the sense we have already assigned to the word).

2. As praise and blame acquire more power over the boy, owing to his developing self-consciousness, we find many cases of volition of a distinctly higher order than the last. Thus both the boys instanced in the last example might be overcome by the extremely curious nature of the operations they were watching. But a third boy might reflect: "Father will be so sorry when he hears I have been late." And if he is very susceptible to the praise and blame of his father, he may make a big effort and be off.

3. Another boy might be a member of a class in which a strong corporate spirit exists, and which hopes to distinguish itself as the most punctual class in the school. The

idea of its loss of prestige, of the disgust of his comrades at his failure to keep up the reputation of the class, may arise in his mind and overcome all conflicting considerations. This is quite a high type of volition for a young boy.

4. But with the highest type of boy, there may arise cases in which he is not directly dependent on some definite approval or disapproval. He begins to be the spectator in the gallery to himself. He says to himself, "I ought to be ashamed of myself idling here when my duty is to get to school." This higher form of self-consciousness is rare. But it is to be found. It is no doubt largely aided in its development by moral instruction in the form of stories, especially if those stories are told by one who exercises a strong power of suggestion over the boy.

Anything higher than this it is scarcely right to expect with young children. If, however, the child has access to good literature and, more important still, if he grows up among people of high moral purpose, he may finally rise to such strength of character that he becomes a permanent law unto himself, and is able to decide for the right amid temptations of the severest kind.

It must not be thought that the moral life is necessarily a long series of severe conflicts such as those described. Habit not only strengthens the sentiment, but it fixes the general line of procedure. It cannot, of course, provide for all the varieties of conduct which are necessary in a complex society. But it can render the self-regarding sentiment so strong and certain in its action that there are no *conflicts* in the proper sense of the term. This is the state of harmony to which reference was made in the last chapter.

"In this way the self comes to rule supreme over conduct, the individual is raised above moral conflict; he attains character in the fullest sense, and a completely generalised will, and exhibits to the world that finest flower of moral growth, serenity. His struggles are no longer moral conflicts, but are intellectual efforts to discover what is most worth doing, what is most right for him to do."[1]

[1] McDougall, *op. cit.*, pp. 262, 263.

There is no doubt that religious belief is often a powerful factor in bringing about this harmonious rule of the self-regarding sentiment. Some, indeed, maintain that without such support this highest form of morality cannot be attained, and they consequently refuse to separate moral from religious education.

We have used the word *character* several times already, and it is fitting that we should give it an exact meaning. *Character* is the sum of all the tendencies which an individual possesses. It is based, therefore, in the first place, upon the instincts and innate tendencies which the individual possesses on coming into the world, or which develop as time progresses. But these become modified by the physical and social environment of the individual, giving rise to more or less fixed dispositions to act in certain ways in relation to certain objects. In other words, they become habits. Character has, therefore, been often called a bundle of habits. But it is more than this. For habits are mechanical reactions to certain definite situations, while life is seldom a series of repetitions of the same situations. There must, therefore, be a power behind the habits which secures modifications of conduct as circumstances arise. "A youth may have formed an excellent set of home and school habits, but if these are all his moral stock-in-trade, he may fail miserably when he enters upon the freer life of college or of the world of business. Life is at all points too complex an affair to be worked by machinery. . . ."[1]

Character, then, retains much of the instinctive and emotional basis which evokes the habits, helps to sustain them, and is itself reinforced by them. It includes the organisation of these tendencies, with their emotions, into sentiments, above all, the organisation of that great ruling sentiment which we have called the self-regarding sentiment. And since the tendencies are towards right conduct, pleasure is found therein—that pleasure which is due to the harmonious working of a system of impulses which all obtain their due amount of satisfaction. As

[1] Raymont, *The Principles of Education*, pp. 328, 329.

Aristotle says, "A man is not good at all unless he takes pleasure in noble deeds. No man would call a man just who did not take pleasure in doing justice, nor generous who took no pleasure in acts of generosity, and so on."[1] This is the state of mind which we have already noted as that of true *happiness*.

Such are the characteristics of the good character. And the goodness of it is measured by the richness of the self-regarding sentiment, especially with respect to its altruistic emotions and tendencies, and by the conative force which it is able to exert when opposing tendencies are aroused. We have already noted that this conative force may be termed *will*. *Will* is, therefore, the most important part of character. If all its *conditions* are included with it, its name may be used as synonymous with *character*. Thus Novalis tells us, "A character is a completely fashioned will."

It is obvious, then, that character depends on both heredity and environment. In other words, it is an affair of both nature and nurture. There are some children who inherit such strong egoistic tendencies and such feeble altruistic ones that the most careful nurture will never make noble characters of them. On the other hand, some beautiful characters are rather born than made, and possess many good tendencies which even an unfavourable environment is not sufficient to repress.

It should be remembered also that the physical nature of the child is an important factor. This is largely a matter of heredity, though environment, especially with respect to pure air, right temperature and food, can modify it to some extent. The physical nature in its influence on the mental is often referred to under the term *temperament*. Mental development is constantly affected by peculiarities of temperament. A child of a cheerful temperament will be highly responsive to bright influences; he will be optimistic, and not easily discouraged. A child of gloomy temperament will require much more stimulation, and will often be a source of despair to the

[1] *Ethics*, I. viii. 12.

most patient and enthusiastic teacher. In all cases, however, nurture can do much. The knowledge of his limitations should not discourage the teacher. He should rather be nerved thereby to make the best of the material entrusted to his workmanship.

Actions which are determined by character, as distinguished from those which are largely reflex or automatic, are usually referred to as *moral* actions. Moral actions, therefore, involve the interference of the self-regarding sentiment in the play of motives. And, as we have seen, the feature of the self-regarding sentiment which is most important in this connection is its altruistic aspect. A person cannot be said to act *morally* until he recognises his relations to others and is influenced thereby. In other words, an individual cannot be *moral* until he develops a *social consciousness*. In achieving this, as we have already noted, he thereby and therein becomes more definitely conscious of himself. Indeed, he cannot know himself without this knowledge of others. No human being can be looked upon as an independent unit. Each is, as it were, the centre or meeting point of a large number of connecting threads. This is what Aristotle meant when he called man a πολιτικὸν ζῷον—a political or social animal. We see, then, that *moral* conduct is essentially *social* conduct. It involves a deep recognition of our relations to others, and the control of our actions in harmony with that recognition. Some writers, therefore, do not attempt to distinguish between the terms *social* and *moral* action.

The teacher must not, therefore, expect moral action of a high type from very young children, who have a very vague consciousness of themselves and of their relations to others. When the actions of a young child seem of a highly moral type, it is probably not true that they involve all those complex considerations which would lead to similar actions on the part of an adult. It is to be suspected that the child is endowed with an unusually large share of altruistic tendencies, which work more or less automatically. This may diminish our estimation of the *morality* of the child. But it is nevertheless a promising foundation for future morality of a high type.

Further, the same kind of consideration will prevent the teacher falling into despair over the numerous undesirable actions which he is bound to observe. He should refrain from considering these in the same way as he would if he were dealing with an older child or with an adult. He should consider them rather as indications of the kind of nature which he has to train than as evidences of a firmly rooted evil character.

In the early stages of education, therefore, the teacher must be content to lay the foundations of good habits, to develop, by means of the organisation and discipline of the school, a self-regarding sentiment which is increasingly altruistic, and to enrich that sentiment by appropriate literature and instruction.

Questions on Chapter XIV.

1. What are the various meanings which have been assigned to the term *will*?

2. Describe a case of *volition* as it might occur in a young child.

3. What do you understand by *self-control*? How is it developed?

4. What is *character*?

5. "Nature and nurture—each has its own part to play in the development of the child." Comment briefly on this from the teacher's point of view.

CHAPTER XV.

ATTENTION.—I.

THROUGHOUT this book the word *attention* has been frequently mentioned. In the chapter on Sensation, for instance, frequent reference is made to it. Take the following as an example:—"The moment any group of sensations get sufficient hold over me to claim my attention a new object arises to obscure, if not to obliterate, all others." In the chapter on Memory it was stated that if an association is to be formed between two ideas, there must be a passage of *attention* from one to the other. In the last chapter we have referred to various considerations occurring before the final volition or effort of will takes place. Now these considerations involve ideas, and these ideas, especially when they attain their full force and clearness, involve *attention*. If it has been decided to do something, the idea of the action in question is attended to. If it has been decided to go on thinking of something, instead of proceeding with some other thing, that something is, of course, attended to.

What, then, is attention? It is no new form of consciousness. It is merely the essential element in all cognitive activity. It is the concentration of consciousness upon one object rather than upon another. And in this and the following chapter we shall merely be concerned in reviewing cognition with respect chiefly to the conditions which determine its direction on one thing rather than upon another. As conation looms largely among those conditions, we have postponed the consideration of this aspect of cognition until after some treatment of conative development.

Concentration of consciousness is inevitable because of the limitedness of mental life. There is only a certain

amount of nervous energy available at any given moment. If it is expended in one way, accompanied by a given form of consciousness (say, attention to a picture), other ways in which it might have been expended (say, attention to one's organic state) must suffer. When, for instance, a little child is crying on account of painful organic sensations which he is receiving, it is sometimes possible to divert his attention by showing him a pretty picture. The state of his internal organs which gave rise to his pain may not have changed. But the excitation of another part of his brain has drained energy from the part affected in connection with his painful state, so that the excitation of the latter part for the time being languishes.

Do we, then, attend to one thing[1] at a time? Or can we attend to more than one thing at a time? As a rule, the bulk of our attention is given to one object. But it is very rare to find the concentration so complete that one object monopolises the whole of our consciousness. Soldiers in battle have been known to be so concentrated on the fight that they have been mortally wounded without knowing it at the time. But such cases of excessive concentration seldom occur. As a rule we attend to one thing more than to any others, but at the same time we are more or less conscious of other things--of things which have just occurred, and to which we were a moment before keenly attentive, of things which we are expecting to occur, and of things which are occurring at the same time, but which are not attended to very definitely. The thing to which we are most attentive is usually said to occupy the *focus* of attention, the other things to which we are less attentive are said to occupy the *margin* of attention. These terms *focus* and *margin* are drawn from the language of vision. But they can be used, in speaking of attention, for any sphere of cognitive activity. Thus an idea (say, of an approaching examination) may occupy the focus of my attention, while a visual percept (say, that of

[1] By "one thing" is not meant necessarily one small object. Four or five marbles, for instance, can be seen and attended to at one glance. Attending to "one thing" here means attending in one direction, *i.e.* to the marbles *only*.

the examination room) may be the principal thing in the margin.

A re-shuffling of positions is continually going on: an object in the margin tends to come to the focus, pushing what *was* at the focus into the margin. Thus, the sight of the examination room may come into the focus; the idea of the examination itself may recede into the margin while I examine the details of the room in which the ordeal is to take place. Further, as one object attains the focus, it not only pushes its predecessor at the focus into the margin, but it tends to cause others to arise in the margin. These others are ideas of objects which have been associated with it in times past. At those times, attention passed backwards and forwards between that object now at the focus and these others. And now, the same process tends to recur. There is a tendency to *redintegration* of those past states. The ideas thus aroused in the margin tend to reach the focus and to displace the object to which their appearance is due. In this way there is a continual kaleidoscopic movement in consciousness. The difference, however, between the kaleidoscope and consciousness is that in the former all the elements are always present, the re-arrangements being always made out of the same elements, whereas in consciousness new elements are continually being dragged in—some being ideas based on past experience, some being percepts due to new experiences in the world of sensation.

There has been in the past an inclination to extol the continued concentration of consciousness on one object. It has been thought that this is the highest form of attention. It is very necessary at times. But it is by no means the most useful form of attention. In the first place, one of the most important conditions of great cognitive activity is change in the object. The person who succeeds in gazing long at one thing, shutting out all else from consciousness, soon goes off into a trance-like state. This, indeed, is one of the ways in which the hypnotic trance can be induced.

Further, if we always attended to one object only at a time, we should never discover the relations between

things. It is precisely because we can attend to one thing with the idea of another still to some extent before us, that the processes of comparison and abstraction can take place. The highest form of attention, therefore, is that in which we attend to one thing with other ideas due to past experience in the margin, so that the relations between this object and those ideas determine higher forms of cognition. Thus, observation, as distinguished from mere perception, involves the bringing of the object presented into relation with ideas resuscitated from past experience. I cannot say that a thing which I perceive is a *ball*, that it is *round*, and *white*, and *big*, unless ideas corresponding to those terms have already occurred in past experience, and are now resuscitated.

This kind of attention, in which there is action and reaction between the object presented and ideas already formed on the basis of past experience, is often called *apperception* or *apperceptive attention*. Even when a child can recognise an object and call it by its name, he is not, as we have already noted, merely perceiving it. He is using at least one idea in his process of perception. "This means, in the language of psychology, that the primitive form of attention which is captured at once by objects that strike the senses, is giving place in some degree to apperceptive attention, which is yielded to things that connect themselves with what we already know. . . ."[1]

The fundamental process in this higher type of attention is as follows. An impression that comes in from without, be it a word which we hear, a thing which we see, a scent which we smell, or something which we touch, becomes connected with ideas already possessed by the mind. If these ideas are not already excited at the moment of the impression, the latter tends to call them up. And it does so according to the laws of memory. If, for instance, we hear someone say "1, 2, 3," we tend to think of "4, 5, 6." Such recall would be due to mere association by contiguity.

But we might also think of "one hundred and twenty-

[1] Raymont, *The Principles of Education*, p. 76.

three," although we had never dealt with that particular number before. Such recall, then, could not be on account of association by contiguity alone. The whole state of mind or mass of ideas connected with number would in this case be resuscitated on account of association by contiguity; but there would be, in addition, a production (by the revived ideas and thought-links) of comparatively new results It is the fate of every impression which gets any hold on the mind already furnished with ideas, to connect itself with, and be reacted on by, some of those ideas, in the way described. And it is to be remembered that continued attention in connection with that impression is only possible when there is such a mental furniture. We then *conceive* the impression in some definite way. We dispose of it according to the cognitive powers or ideas which we already possess. It is obvious, then, that *apperception* is only another name for *ideation*, or *conception*. The ideas or concepts with which we are armed are called by Herbartian psychologists the "apperceiving mass" or the "apperception mass." The new impression is engulfed in this, and the result is a state of consciousness produced by the interaction of new and old. The new is understood on the background of the old. And, as a result, our mental furniture has to some extent been modified, so that the "old" which we shall call up on a subsequent occasion in the same sphere of thought, when some other new impression is presented, will be a richer "old" than it would have been, had the experience described never occurred.

It should be noted that we have spoken of the impression as "new." By that we mean that it must appear to some extent strange to us. There must be some aspect of it which is not familiar to us. If there were no such aspect, *i.e.* if the thing appeared completely familiar, no interaction between *new* and old could take place. For there would be nothing new. "Same old thing!" would be our attitude, if we attended to it at all, and we should pass on to something else. This means that the mental furniture is aroused, but only finds something like what has been seen before. The work of

apperception has already been done in the past. And this present case is only a repetition of the same process. Now it is a universal law that processes which are repeated in exactly the same way become mechanical, and consciousness gradually retires into the background. The nervous processes involved seem to take place so smoothly and swiftly that little consciousness can be aroused. *Apperception,* the process of learning something new, becomes mere *assimilation,* the process of casually recognising what has already been thoroughly understood.

But it should be noted that the impression must not be *too* "new." A *totally* new impression would be something unlike in *all* respects to anything experienced before. We should then have *no* ideas with which to react upon it. We should fail to make anything of it. To use the expression of Professor Adams, we should be at the "gaping point." Of course it is impossible, after the first few years of life, to find anything completely new. But things may be *too* new for us to tackle them. It was observed, for instance, that savages, seeing some foreign merchantmen for the first time, were more interested in the little boats which put off from them, than in the wonderful ships themselves. Those little boats were new to them, but not *too* new. They had some ideas of boats, derived from their own primitive craft But the gigantic ship was beyond their comprehension.

We see, then, that for *apperception* to take place, the object must be partly "new," partly "old," *i.e.* partly familiar, partly unfamiliar. When this is the case, we have the conditions of *curiosity*, and there is an attempt to learn more of the object.

It is now clear that *observation* is always a process of *apperception.* Whenever, indeed, our attention *dwells* on something, whether it be an external object or an idea arising in the mind, that something is transfigured by being brought into relation with the ideational traces of past experience—in other words, it is *apperceived.* Apperception, then, includes both observation of objects and reflection upon ideas and their relations. Both may be subsumed under the general term *judgment.* Every judg-

ment implies the elucidation of something which is presented to the mind by means of something already possessed by the mind. Every judgment may be thrown into the form—*This* (which is presented to my mind and to which I begin to attend) *is* (on account of ideas aroused during the process of attention cognised as) *so and so* (" so and so " being one or more of those ideas aroused during the process of attention).

Reasoning is also a form of apperception, for it involves judgment. In this case, however, we have not merely the ideas involved in the judgment actually made (as the conclusion of the reasoning), but other ideas which are seen to be related to the former ideas, and which determine the selection of those ideas. Reasoning is thus the highest form of apperception. It involves apperception on two planes. There is on the lower level the actual judgment reached, which itself involves apperception, and there is on the higher level the recognition, in the light of other ideas, present in the mind and guiding the process, that this judgment fits into the system constituted by those other ideas.

We see, then, that all cognitive processes are forms of attention, and that all but the simplest forms involve some degree of ideation, and may, therefore, be considered as forms of *apperception*. But we have seen that it is usual to reserve this latter word for those cases alone in which some definite change is made in the mind's ideational content by the examination of the new material. Thus, when a boy finds that a whale breathes air and suckles its young, and comes to the conclusion that it is not a fish, but a mammal, he would be said to have performed a process of *apperception*. But when, later, he sees another animal of the same species and is able to call it a mammal on account of this previously acquired knowledge, his mental process would not, by some writers, be called *apperception*, but rather mere *assimilation*. The term *apperception*, then, is, strictly speaking, to be reserved for the formation of *new* ideas; it is to be applied to ideation in its productive aspect, and not to the mere use of ideas or judgments already made.

This is an important distinction. True, much time is spent in employing ideas already formed rather than in making new ideas or new combinations of ideas. But it is often difficult to say how far a given process is productive, how far merely reproductive. Further, even in the employment of old ideas, using them in new judgments, we are not necessarily standing still in the ideational world. We are to some extent fixing and extending the power of what has already come into existence. This is a necessary preliminary to further advances. Often, indeed, we find that advances are gradually made during such exercises. We find, after a given period employed in this way, that, though we cannot point to any given moment when a step forward was taken, we have nevertheless improved, if not in the extent of our knowledge, at any rate in organisation and grip. At the same time it is necessary to point out that the processes of establishing and organising what has been acquired can go on too long. We then sink to a lifeless assimilation of things by well-known ideas, which, though it still involves ideas, has dropped to a level little, if at all, higher than that of mere perception. Such work has a deadening influence on the mind. Exercises on newly acquired ideas should never be carried on so long that they become quite mechanical. To take an example, this caution was not observed in the days when parsing and analysis were continued long after the pupils thoroughly understood the grammar involved. There is a danger of the same kind of thing in arithmetic, especially where speed and accuracy become the chief objects of the teacher.

Sometimes the object which is to be apperceived appears first, and ideas connected with it on account of associations previously formed appear later. Thus, I may see a dog somewhat different from any dog I have seen before, and this may set me thinking of my own dog at home, as well as of other dogs which I have seen. I may thus be led to attend to this present dog more carefully than I otherwise should have done. Special points are noticed, these again involving the resuscitation of ideas based on past experience. As a result of the whole

process my knowledge of dogs is enriched. I have *learned* something. A process of *apperception* has taken place.

Sometimes the ideas requisite for apperception are aroused first, the object to be apperceived presenting itself afterwards. It is fairly obvious that under these circumstances, apperception takes place more rapidly, and in a more definite way. This has, further, been demonstrated by experiments. When individuals are told beforehand the kind of thing they are to expect, they recognise and name it more quickly than when they are not told. There is no interval necessary for the ideas to arise, and there is no uncertainty as to which ideas will arise. For it must be remembered that when the object comes first, any one quality or aspect out of many may arrest attention, and call up its own associated ideas, and, further, that, even if only one aspect attracts the attention, it may in past experience have been associated with many ideas. Consider, for instance, the accompanying diagram (Fig. 20). It may be apperceived in various ways. If the ideas aroused in connection with it are of *plane rectilineal figures* it may be apperceived as a trapezoid. If the ideas aroused are of *figures seen in perspective*, it may be taken for a square in a horizontal position a little above the level of the eye. If the ideas aroused are of *hats*, it may be taken for a rough sketch of a particular kind of head-gear. If I am thinking of *basins*, this may be taken for a straight-sided shallow vessel seen on a level with the eye. If, however, I am thinking of *boats*, it may be apperceived as an elementary form of water-vehicle. It is, therefore, clear that if I ensure the arousal of certain ideas beforehand, the apperception can be determined swiftly and certainly in the direction which I desire.


Fig. 20.

Now this is just what the teacher has to do. He has not merely to see that the children attend to certain things, but that they attend to them with a certain background of ideas, so that the process of apperception shall be the same in all cases, *i.e.* along the line which he intends the

lesson to take Accordingly, he does not merely present objects to them, but he sees that certain ideas are aroused beforehand. This preliminary work is known as the *preparation* or *introduction*. Obviously it is of no use going on to the *presentation* of the new material unless the children are able to call up the necessary ideas, or *apperception masses*,[1] wherewith that new material is to be apperceived. The teacher must consider carefully, before he decides on his lesson, whether the children are likely to possess the necessary preliminary ideas. Many a lesson is wrecked on this rock. When the lesson begins, it is found that the previous knowledge of the children is not sufficient to enable them to grasp the new material. Either the teacher goes on to his presentation and fails to make himself understood, or else he spends the whole lesson-period in attempting to make good what was wanting, *i.e.* in giving a lesson involving only the preliminary ideas which his lesson assumed as known and as needing only arousal in the minds of the children. The latter is, of course, the better course. But it is better still to ascertain clearly what is the state of the children's minds, so that the lesson best suited to their stage of progress can be prepared.

Sometimes the teacher, in his anxiety to be sure of a good foundation in the knowledge already possessed by the children, may underrate that knowledge, and find that his proposed "new" material is not new. In this case, there is no apperception. There is merely *assimilation*. And, unless the children are greatly interested in the subject for other reasons, they will be bored, and will show signs of inattention. One of the reasons, therefore, why children fail in attention is because the teacher does not give their minds sufficient scope for activity! It is almost unnecessary to add that such lessons are practically useless, since the children learn nothing new.

This, however, does not mean that all repetition of lessons previously given is to be tabooed. We have already

[1] *Apperception masses* are nothing other than the systems of ideas referred to in the chapters on Ideation and Reasoning.

noted that the results of a given apperception require to be firmly established and extended. And many of our school lessons consist of revisions of, and exercises upon, ideas which have already been obtained. It must be remembered that repetition is necessary when the results of the previous apperceptive processes are not firmly established, and that consequently a repetition of those processes still involves something new. For the new remains comparatively new until it has been thoroughly grasped and retained. Further, the intelligent teacher can set about his repetitions in somewhat different fashion, so that there is more novelty about the revision than there otherwise would be.

We see, then, that the difficult task of the teacher consists in selecting material which will find already existing in the minds of the children sufficient knowledge for *apperception* to take place, but not so much that mere assimilation will alone be necessary.

This, therefore, is one of the conditions of the higher or apperceptive form of attention. When ideas connected with the new material presented are already aroused in the mind, attention to that new material is greatly facilitated. "This reinforcement of ideas and impressions by the pre-existing contents of the mind was what Herbart had in mind when he gave the name of *apperceptive* attention to the variety we describe. We easily see now why the lover's tap should be heard—it finds a nerve-centre half ready in advance to explode. We see how we can attend to a companion's voice in the midst of noises which pass unnoticed though objectively much louder than the words we hear. Each word is *doubly* awakened; once from without by the lips of the talker, but already before that from within by the premonitory processes irradiating from the previous words, and by the dim arousal of all processes that are connected with the 'topic' of the talk. The irrelevant noises, on the other hand, are awakened only once. They form an unconnected train. The boys at school, inattentive to the teacher except when he begins an anecdote, and then all pricking up their ears, are so easily explained. The words of the anecdote shoot into

association with exciting objects which react and fix them; the other words do not." [1]

It may be noted that the preceding quotation, calling attention to one of the conditions of swift apperception, is itself favoured by that condition. For it is introduced at a time when the necessary ideas are aroused and ready to grasp it.

But underlying the ideas is another and still more important factor of the attention-process—a factor which will often triumph over the difficulties just raised with respect to the novelty of the material presented. When this factor is strong, repetition involving mere assimilation can go on again and again without boring. Little children will listen to the same story times without number, long after they have thoroughly understood it. Why is this? Because they *like* it. But what does this mean? It means that some of their instinctive and innate tendencies are aroused, and appealed to. Thus Professor James speaks of the "lover's tap." This is not heard merely because ideas, considered as cognitive elements, make it clearer. It is also, and chiefly, because those ideas are the cognitive aspects of a strong tendency. There is nothing very new about the tap. It may have been heard a hundred times. But it arouses the strong sentiment which we call *love*. And it is this which is the chief factor in determining attention to it.

A very striking example of the way in which a strong instinctive tendency will determine attention, even to feeble impressions, was given by Itard in his observations on the wild boy of Aveyron. "His ear," he tells us, "was of all his senses the one which appeared the least sensitive. It was noticed however, that the sound of a nut, or of any other eatable thing which he liked, never failed to make him turn round. This observation was unmistakeable; and yet, this same organ was insensitive to the loudest noises and even to the explosions of fire-arms." [2]

The mother who hears the slightest sound made by her

[1] James, *Principles of Psychology*, Vol. I., p. 450.
[2] Itard, *Rapports et Mémoires sur le Sauvage de l'Aveyron*, p. 17.

child, though she may be deaf to many louder noises, is another example of the same truth. Often the underlying tendency is one which is not purely instinctive, having been developed into a *habit* by practice (itself dependent on other, and probably instinctive, motives) during the lifetime of the individual. The mother's tendency may partake of this character. That of the trained nurse is usually still more of this nature. But the fact that the well-trained nurse is sometimes superior in her attention to the mother, who depends more largely on her maternal instinct, is instructive and encouraging to the teacher, showing, as it does, how *habits of attention* can be created in cases where, if nature were left to work independently of training, very little attention would be obtained.

At the same time, it is to be noted that such habits, though they cannot always be built upon an innate tendency towards the object to which attention is necessary—for the simple reason that such a tendency may be either non-existent or quite insufficient in its force—must find the motive power which ensures the long-continued practice necessary to produce them in some other innate tendencies. The nurse who begins with little love for the sick may yet become exceedingly attentive because of the fact that she has to get her living by this means, or because, being filled with the spirit of emulation, she is determined to excel, or because she catches the spirit of her sister nurses. A direct tendency to the object in question is always the surest and best means of securing unremitting attention to that object. But when this is in any degree lacking, other innate conative forces must be tapped, either to supply its place, or, at any rate, to reinforce it.

Innate tendency can secure attention even when no apperceptive process takes place—when the object is merely contemplated, or played with, or enjoyed, without any further knowledge resulting. But when it is united with the play of apperception masses on the object, so that modifications of ideas ensue, we have the higher and more concentrated form of attention which we have called

apperception. The object is not merely contemplated and accepted; but, in the light of the ideas aroused, it stands out as in some respects strange, it awakens curiosity, it challenges further examination, it arouses a questioning attitude. "The awakening of this intellectual attitude is shown when a child wants to know more about things. Then first he really attends to them as things." [1] So says Professor Welton, and he goes on: "One of my own earliest remembrances is, when three or four years old, cutting open a toy drum 'to see where the noise came from.' This certainly marked by an act of attention the liberation of an intellectual interest." [2]

Professor Welton suggests that the word *attention* should be given only to this higher apperceptive process. To indicate the lower form from which it springs, and to which it tends to revert, if apperception, repeated under similar conditions, gives way to mere assimilation supported by instinctive and innate tendencies, he prefers the word *absorption*. He writes, for instance, as follows:—

"When we allow the current of our thoughts to be determined by the objects around us, we ought not to speak of ourselves as attentive. There is no purpose working in the line of intellectual or practical interest. We make no effort to determine what we shall hear or see next, we accept whatever comes. As an instance, let us imagine ourselves present at a cinematograph show. The pictures may be excellent, and may succeed each other without breaks, and yet without any suggestive connexion. Our interest may be intense; our whole consciousness may be filled by the show; we are so absorbed that we notice nothing else. We are full of enjoyment. But we are not full of thought. It is quite correct to say we are absorbed; it is confusing and misleading to say we are attentive. Of course, attention may be present. If the pictures raise in our minds an attitude of enquiry, if they form a story-series which we try to follow and grasp as a whole, then so far the direction of our thoughts is determined by the desire to understand, and we are attentive. Even then,

[1] Welton, *The Psychology of Education*, p. 240. [2] *Ibid.*

however, the attention is quite subordinate to the emotional interest."[1]

But while this "emotional interest" is, *by itself*, of little value for intellectual advancement, it must be present in some form as a support of the purely intellectual processes. The germs of intellectual interest are bound up with it. For apperception to take place, therefore, there must be present all the cognitive conditions which we have noted, but at the same time there must exist a strong conative factor. The cognitive machinery must be set in motion by conative force. Neither is of much use without the other. Yet when we are occupied with consideration of one, we tend to forget the other. (This itself is an illustration of the fact, that one object coming to the focus casts another into the margin.) Thus, when Professor Adams tells us, "In every case attention owes its direction to the emotional states that accompany mental action; in other words, attention follows interest,"[2] we are apt to think that the emotional and conative factor is the only thing which determines attention. But on the next page we are told: "Interest depends upon the apperception masses that can be brought into relation with the given object. . . . If I want interest, I must . . . seek to find a place for it in some respectable apperception mass."[3] This emphasises the cognitive conditions; and we are now tempted to consider these as the only essentials. But both sets of conditions are necessary. It is not sufficient to be *able* to understand an object, we must be *anxious* or *desirous* to do so. "It is true, that to find a book interesting we must have sufficient knowledge to understand it; but it is not true that we find interesting everything we have sufficient knowledge to understand."[4] "What more deadly uninteresting object can there be than a railroad timetable?"[5] asks Professor James. Many of us, however, can understand it. We have the requisite "apperception masses." "Yet where will you find," proceeds Professor

[1] *Op. cit.*, p. 237. [2] *The Herbartian Psychology applied to Education*, p. 258. [3] *Op. cit.*, p. 259. [4] Welton, *op. cit.*, p. 187. [5] *Talks to Teachers*, p. 95.

James, "a more interesting object if you are going on a journey, and by its means can find your train?"[1]

Here, then, is the secret. The "apperception masses" will not ensure continued attention unless they are associated with a strong conation. In the case just cited, the conation is not directly concerned with the object with which the "apperception masses" deal. But it requires a knowledge of that object in order to attain its end.[2] In such a case the interest in the object is derived from the interest in the end to which a knowledge of that object is a necessary step. Such interest is, therefore, called *derived interest*. Often, however, the conation is towards the very object with which the "apperception mass" is concerned. Thus, a boy who is fond of cricket will watch a famous batsman with the utmost attention, noting all his strokes and attitudes. He both understands *and loves* the game. His interest is *direct*. Another may understand the game as much, but may not be so keen on it. His attention will not be so concentrated. His apperception masses are as numerous and as well organised. His interest is also direct. But it is less powerful; in other words, he has not such a strong tendency to this kind of material. Or take an example from school work. Suppose two boys who know the same amount of geography, but one of whom has acquired a liking for it, while the other has learned the same amount under compulsion. Give each of them a readable geographical book. One will devour its pages, while the other will possibly not care to peruse it at all.

We see, then, that the "apperception masses," considered as mere ideas capable of revival, are only machinery which *may* produce continued attention. They are, it is true, absolutely necessary for continued attention along certain lines. And we have already considered their manner of functioning. To use another metaphor, they are the rails laid down along which the train of thought

[1] *Talks to Teachers*, p. 95.

[2] See a similar example quoted from Professor Adams on page 186 of this book.

may move and without which it could not move. To this extent they can be said to determine attention. But unless the engine has motor power, or, to drop all metaphor, unless there is conation or interest, there will be no pushing forward.

Usually, of course, and especially after some experience, where there is interest there are also many ideas connected with the object, and *vice versa*. We should be sceptical about the declaration of interest in cricket by a boy who could not tell us much about the game. And when we find a person knowing much about a subject we are apt to conclude that he is interested in the subject. But this is not always the case, as we have seen in some of the examples lately cited. To mention another, a man may know a good deal about prisons, but he may not care to talk or think of them. The sight of one may cause extreme aversion. When, however, the ideas possessed *are* interesting to the individual, *i.e.* when they involve strong conative forces which are aroused with them, we get continued attention, *guided* by the ideas, and *sustained* by the conation.

All that we have noted may be summed up by the statement which has already been made much earlier in this book, *viz.* that cognition exists and functions in the service of conation. When we lay down the conditions of cognition as such, we must always remember that they cannot be effective unless conation arises. *Apperceptive attention*, therefore, although it can only proceed with its "apperception masses," cannot be accounted for by mere reference to them. It must have conation, or interest, behind it.

The teacher's great task is to secure attention to the things about which he has to talk. And the more he can understand of the conditions which determine attention, the more likely he is so to arrange matters that he gets attention directed in the desired direction. The usual advice given to the young teacher is that he should *interest* the children in the lessons. Often, however, when he seeks to know what it is to be *interested*, he does not get further than the statement that it means to be *deeply*

attentive. But this is no solution at all. It is only substituting one word for another. If the word *interest* is to be of any use to the teacher, it must mean something other than attention itself.

Sometimes the word *interest* is used to signify the whole state or process of which attention is one aspect. It thus includes all the conditions as well as the attention itself. Sometimes the word is specialised to refer to the hedonic tone of the process. But we have already a number of terms for this, such as pleasure-pain, feeling, affection, as well as the one just employed. Probably the most useful meaning we can give to *interest* is that which it must have in such a sentence as: *Interest determines attention.*

Now here it might be pointed out that the object itself is one factor. Without an object we could not attend. But it is usual to take this for granted, and to limit the meaning of *interest* to the *subjective* conditions, the state of the *mind* which determines attention to that object. Interest would thus include the cognitive and conative conditions which we have lately been examining. Thus, if I ask why a man attends to all the actions and expressions of his little son, the answer is that he *loves* him. In other words he has developed a strong psycho-physical disposition which involves a great many ideas with respect to the boy, the liability to experience certain emotions in connection with certain situations of that object, and the tendency to act or attend in certain ways —in short, he has developed a strong and well-organised sentiment of parental love.

Now the most characteristic and the most fundamental feature in all this is the *conative.* It is well, therefore, to give to the word *interest,* as the central and most important part of its signification, the meaning *conation,* always remembering that conation does not exist by itself, but is accompanied and directed by ideas and by emotional and affective states.

This is largely in harmony with Professor Stout's point of view. He writes: "Attention may be defined as interest determining cognitive process. When I am interested in an object, the satisfaction of my interest may

depend partly or wholly on a fuller, more distinct, or more prolonged presence of the object to cognitive consciousness. So far as this is the case, the self-fulfilment of my interest is attention." [1]

Now we may not be giving exactly the same meanings to the words as Professor Stout; but we shall not be far wrong, and we shall at any rate be making the matter a little more definite, if we take *interest* as meaning, above and before everything else, *conation*. As for *attention*, we have seen that it is an essential element or aspect of all cognitive process. Just as we cannot have matter without weight, so we cannot have cognitive process without attention. If cognitive process is to take place, we must have attention; and, conversely, if attention is to be aroused, some sort of cognitive process must be possible. Hence the conditions of cognitive process are also conditions of attention. We may say, then, that *attention* is, on the one hand, subject to the laws of cognitive process, and, on the other, is aroused, or caused by, *conation*. It is the expression of conation in the cognitive sphere. Or, "if we care to use a bold metaphor, we may say that attention is the light used by conation to make out its path. Only we must remember that attention is no external illumination, but is simply identical with conation considered in its cognitive aspect." [2] The problem, therefore, of discovering the determinants of attention is that of tracing the conditions of cognitive process or apperception on the one hand, and the unearthing of the conations, which are the driving force of that cognitive process, on the other. With the former we have already dealt at some length. It remains to say something of the latter and more fundamental.

But we have already noted a great deal with respect to the conditions of conation in preceding chapters. All this, therefore, applies to the determination of attention. We have not a new problem on our hands. The problem of securing right conduct, that is, the right direction of

[1] Stout, *Groundwork of Psychology*, p. 48.
[2] Stout, *Manual of Psychology*, p. 257.

conation, is the same as that of securing the right direction of attention. At the moment when a certain thing is to be done, the last thing we can trace in consciousness is attention to the idea of that thing being done. Behind this is the mysterious force which we call *conation*, the tendency of the idea to work itself out. And if there is sufficient conation to suppress counteracting ideas, the idea does work itself out, and we have a corresponding movement.

Attention, then, may properly be called the cognitive aspect of conation. If we descend to the lower levels of conation, as found in the lower animals and in young infants, there is, of course, no definite cognitive aspect: we speak of such conation as *blind craving*. But as the mind develops, conation becomes enlightened, and it can achieve its ends only through cognition, *i.e.* it requires attention to guide it. And this is so, whether its course lies through a certain series of actions, or through a train of ideas. In the former case, there must be attention to the ideas of the actions; in the latter, to the ideas involved in the subject of reflexion. There is a vast difference between the two courses which conation may take. In the one case movements take place and bring their products (*e.g.* kinæsthetic sensations and new touch and sight sensations) into consciousness; in the other, further ideas and images arise in consciousness. But in both cases attention is the means whereby conation proceeds.

We have seen that the roots of conation are the instincts and innate tendencies of the child. It is clear, therefore, that the teacher who desires to get attention must appeal to these. It is of no use to fight against nature. It is of no use to say: The children must attend to this in the way I prescribe. The teacher must rather ask himself: Are the children of such a nature that they will attend to this in the way I propose? It is of little use, for instance, to propose for young children of seven an oral lesson on geographical terms, lasting forty-five minutes, and without any illustration. In the first place such a lesson is largely meaningless to the children. For the basis of ideation must be laid in active perception and

observation. So much for the *cognitive* conditions. Next of the *conative.* Even if it were not entirely meaningless, such a lesson would still be out of place at this age. For very little conation could be aroused in connection with the abstract ideas proposed. Healthy young children cannot remain still for such a long period. They must be *doing* something.

A strong disciplinarian may assert that he *has* succeeded in holding attention in this way. But he has not done so in spite of nature. Without perhaps being aware of it, he has been making use of the children's instinctive and innate tendencies. His personality may be of so dominating a kind that he has reduced the children to a state of complete subjection. He has in a measure hypnotised his class, so that they follow him to some extent through courses of ideation which they do not clearly understand, and which they would not follow if they were not reduced to the condition in question. Finally, he may have aroused in them so great a fear of punishment, that they are willing to follow with docility any line of thought rather than come under his displeasure. But this is not the most satisfactory appeal to the children. The knowledge acquired is largely verbal, and is certainly distasteful. The final test of all our teaching is the interest which the children take *in the subject.* The school which turns out its pupils with no tendencies to go on with their studies by themselves has failed in the chief purpose of a school. When this dominating personality is removed from the lives of the children, they are left dead and lifeless with respect to the subjects which he taught.

Let us take another example. Little children in the early stages of reading are often expected to look on their books and point, while one of their companions is laboriously struggling with word-recognition. *Often the same paragraph is read over and over again.* It is obvious to all but the most stupid that work of this description does not appeal to the intelligence of the children, and that there is no possibility of sufficient conation arising in connection with such an occupation to determine close

attention. Even if the matter, as read the first time, is interesting, and is understood by the children, the slow repetition of the words, over and over again, by dull scholars, renders the whole business distasteful. We have only to suppose ourselves treated in the same way with respect to a novel, to realise that it is an exceedingly tiresome business.

What, then, is to be done? In the first place we should put books into the hands of children only when they can read most of the words with some degree of fluency. They should then be helped rapidly over the difficult words by the teacher, or by their more advanced comrades (who will thus have something to do). The books should contain tales which are extremely interesting to the children. And the reading of a tale should not be repeated unless the children themselves desire it. It goes without saying that a large number of books will be required if this method is pursued. When once they have been procured, they will last for a long time. For they will be used less, and they will not be worn out by the rough treatment of children who are disgusted with them. Very soon, too, a *single* new book will suffice for a lesson from time to time. Individuals can take turns in reading to the class. In this way the necessity for clear speaking will be brought home to the children. Insistence on it should not be allowed to spoil the interest of the early lessons, during which, since all the children have books, clear speaking is not absolutely essential.

The question still remains—How is the preliminary knowledge of words to be obtained? It can, perhaps, be gained most expeditiously on the Look-and-Say plan, in which the children have as much *to do* as possible. The teacher prints words on cards, beginning with the names of the children themselves, and with names of things in the school-room. These might even be fixed upon the things to which they refer, during the early stages. Interesting competitions are organised in which children are tested in the recognition of words shown for an instant only.

Sentence-building, (not *word*-building) is then indulged in. The teacher puts a number of words together to make

a sentence. The children have little boxes containing these, and other words, and they are directed to find the words required, and to arrange them to form the same sentence. The sentence is modified by the teacher, and the scholars modify their own imitations. Those who get done first are invited to make up sentences from the other words contained in their boxes, and they should be allowed to read these afterwards. Both in selecting and in rejecting words from their boxes, the children are engaged in word-recognition, which is the essential business of reading And, if fairly interesting sentences are made and talked about, the children will become apt in seizing the meaning of a number of words linked together. By such exercises as these the children very soon become familiar with the most common words, and are able to read and understand easy sentences. They can then receive books. And they should plunge into them rapidly, being helped as much as is necessary by the teacher. The chief object should be to tide over the dull business of word-recognition quickly and pleasantly, and to arouse the true motive for reading—interest in the matter—as early as possible.

It is impossible in a work of this scope to cover the whole field, and to show how, in every subject, the teacher must be sure both that the children understand what they are about and that they have sufficient conative force to carry the business through. Many "born" teachers, *i.e.* teachers who are naturally sympathetic with children, and enter into their lives, understand their business fairly well, without ever having made a distinct study of psychology. They have, however, been studying psychology, though sub-consciously, *in the school-room.*

In a sense, the whole of this book deals with the conditions of attention. For it treats on the one hand of the conditions of cognition and its development, and on the other of the conative forces which drive cognition onwards. To sum up the whole matter, the children must have presented to them things which they can grasp with due effort, and they must have sufficient motives to cause them to grapple with those things.

It is scarcely necessary to remind the reader that among the most important essentials to the best efforts of attention are, on the one hand, a healthy, vigorous body, free from fatigue or from any other disturbing condition, and, on the other hand, a favourable environment, especially one which contains no objects likely to interfere with the course of thought or observation. These things, though not in themselves mental factors, are the physical concomitants of much that is mental. Thus the healthier and more vigorous the body, the stronger will be the conative forces aroused. Further, any disturbing element, whether of the nature of painful impressions due to bodily conditions or of the nature of pleasant or painful percepts of things around, always acts as a competitor for attention, thus weakening, and sometimes overwhelming, the attention in the desired direction. We cannot, therefore, expect children to attend successfully to a difficult lesson when they are tired, or oppressed by hot, damp weather, or disturbed by noises and other happenings. Just as the athlete who wishes to accomplish a good performance, especially if he desires to break a record, selects a time when both he and his conditions are at their best, so the teacher who has to give a lesson demanding much concentration of thought on the part of the boys would do well to arrange it for the most favourable time of the day. Many a lesson has been a failure chiefly because of the fact that it demanded much careful attention at a time when the boys were not in a condition to render it.

Questions on Chapter XV.

1. What is meant by *attention*? How can it be cultivated in children?

2. Explain and illustrate the statement, "Right methods produce interest."

3. What is *interest*, and how is it related to *attention*?

4. What do you understand by *apperceptive attention*?

5. "A teacher must not expect a child to be interested in that of which he is wholly ignorant." How does this bear on the method of teaching?

6. Why do we fail to remember what does not interest us?

7. If you found the class you were teaching getting listless and sleepy, what causes would you suppose to be at work, and what would be your remedies?

CHAPTER XVI.

ATTENTION.—II.

VARIOUS kinds of attention have been distinguished, and classifications based on different features have been made. To take an analogy from common life, we might classify men according to *height*, to *age*, or to *profession*. It is obvious that we should have considerable overlapping. So with attention. We have seen that it depends on both cognitive and conative conditions. Classifications may therefore be made according to either of these sets of conditions. We shall first consider two cognitive classifications—(I.) one founded on the nature of the object, and (II.) one founded on the cognitive condition of the mind to which the object is presented. Lastly, we shall consider the most important classification of all, viz. (III.) that founded upon the nature of the conations involved.

I.—Attention can be classified according to *the nature of the object* to which attention is paid. We then get (1) attention to objects of sense, and (2) attention to ideal or represented objects. It is obvious that we begin life with the former, and that the latter is derived from it as experience proceeds. But after a little development the two become inextricably mixed. We often attend to objects and to ideas which have become associated with them, at almost the same time. Still, it remains true that attention to objects of sense is often an aid in attending to ideas. The percept, especially with young children, is usually a more impressive thing than the idea. It comes with all the force of sense-stimulation behind it. And the teacher of young children, even when he wishes

to direct their attention chiefly to ideas, makes free use of the concrete. Pictures, diagrams, models, and often the actual objects, are freely used in schools. Not always because attention is desired principally to them, but often because they facilitate attention to certain ideas.

II.—Attention may also be classified according to *the cognitive condition of the mind to which the object is presented.* This gives us in the first place (1) *the primitive form of attention,* which is given either (*a*) to objects that strike us, without any warning or preparation on our part, by reason of the intensity, voluminousness, painfulness, or suddenness of the impressions made, or (*b*) to objects which appeal to some special instinct or innate tendency.

In the second place, we have (2) *apperceptive attention,* which must, of course, have an object (sensorial or represented) but which depends largely for its direction towards any particular aspect of the object studied, on those ideas connected with the object which the mind summons up before or after the moment of presentation.

(1) (*a*) The first of the two primitive forms of attention just mentioned may be called *enforced attention.* It is the attention which is compelled by a loud noise, a bright light, a painful organic sensation suddenly shooting into consciousness, or a disagreeable idea obtruding upon us. It is an extreme instance of the general cognitive condition of all attention, *viz.* that *there must be something to attend to.* The more striking that something is, the more likely will it be to attract attention independently of other conditions. It may thus determine a response on its own account, irrespectively of any special pre-formed psychophysical disposition. This response is a simple form of conation, and, as such, involves attention. The conation aroused in this way, however, is an isolated reaction; it is, as it were, a return to equilibrium after a disturbance. And if there is no connection between it and other portions of the stream of consciousness, it speedily dies down.

Enforced attention is sometimes called *involuntary attention,* in order to distinguish it from those forms which are due to the arousal of strong organised tendencies,

and which are hence called *voluntary* by some writers. But if the word *voluntary* could be used to signify the presence of *any* conation, we could perhaps allow it to be applied even to enforced attention. As we have seen, an elementary and isolated conation is involved. In some cases, indeed, definite instinctive tendencies are aroused. Thus, in cases of sudden shock there is nearly always a tinge of fear. In so far as this is the case, however, it can be pointed out that the attention is not purely *enforced*, but mixed with that variety which depends on definite innate or instinctive tendencies, and which we have referred to as the second form of primitive attention. And since the word *voluntary* is usually employed with reference to these more definite tendencies, it is well to avoid using it in the present instance. We shall find later that it is sometimes refused even to cases of instinctive tendency, and specialised to signify a still "higher" form of attention. Now a word which is used in such varying fashion is likely to lead to much confusion. This, indeed, has been the case to a remarkable extent. Accordingly the word *voluntary* (as well as *involuntary* and *non-voluntary*) is best avoided altogether.

It is obvious that enforced attention, by itself, is not of much value to the teacher. Weak teachers, failing to secure the attention of the scholars by any other means, often resort excessively to it. They are given to shouting, to banging on the desks, to ringing a bell, and, in general, to producing a series of shocks. As we have seen, however, these obtain only a momentary reaction. And this reaction is made to the person or thing creating the noise, *not to the subject of the lesson.* Further, such shocks lose their effect by constant repetition. We soon become habituated to continual noise. It is *change* which is the real cause of the effect produced. And when a teacher has been shouting for a long time, the best way of securing enforced attention would be to stop suddenly, or to drop his voice to a whisper. The intelligent teacher is aware of this, and while he finds it necessary sometimes to raise his voice, he more frequently drops it, or stops altogether. He knows the value of the *pause*.

We have just noted the evils of excessive appeals to enforced attention. It is, however, apparent that it has its place. No teacher can afford to neglect any means of securing attention. And *variety* is of great importance. While, therefore, this form of attention is not to be chiefly relied on, it may continually assist the other forms. With young children especially, there must be frequent changes in the method of attack. And apart from, and in addition to, variations in the method itself, the voice should be ever changing. Not, of course, in haphazard fashion, merely to secure some enforced attention, but in harmony with the subject. There are three ways in which the voice can change—in pitch, in loudness, and in speed. In sympathy with the treatment of the subject, continual changes should be rung on these. Even when other features of a lesson are good, a monotonous voice is a serious drawback.

The teacher should not only recognise that enforced attention may be his ally, but he should remember that it may also be used against him. He should do all he can, therefore, to prevent any occasion of disturbance. The more a teacher recognises that attention is subject to definite laws, the less will he be inclined to become angry when he loses it. He will rather be induced to inquire into the causes of the diversion of attention. Instead of storming at a child who turns round when the door opens behind him, the teacher should recognise that the child has done a natural thing, a thing which many an adult would do, even when listening to an interesting lecture. And he will do all in his power to avoid such disturbances, both from without and from within the room. He will see to it that when he is presenting something to his scholars there is no other thing which is likely to be more striking.

(*b*) As we have already noted, the second form of primitive attention, that due to the excitation of some primitive instinct or innate tendency, is often mixed with the first, and is sometimes only to be distinguished from it with great difficulty. But, as we saw in the chapter on the Instincts and Innate Tendencies, there are some

objects which, apart from the intensity, or suddenness, or voluminousness, or painfulness, of their impressions (though, of course, they must possess some of these qualities in some degree), attract attention by virtue of the fact that they "touch off" an innate psycho-physical disposition. All the instinctive and innate tendencies are excited in this way by certain objects. When these objects are presented, therefore, attention is given spontaneously to them. Such objects do not produce the same kind of impression on different animals, and even in the same species they vary in their effect because of the varying degrees of completeness in which the psycho-physical dispositions are found. In the human race, however, we can say that strange things, moving things, wild animals, bright things, metallic things, spoken words, and blood—not to mention many other objects—frequently arouse the primitive form of attention which we are considering. We may call this form, to distinguish it from enforced attention, by the name of *primitive spontaneous attention.*

There is one tendency which is so general that it is liable to be overlooked—the tendency to seek pleasure and to avoid pain. Since some amount of pleasure-pain occurs in connection with all experiences, *appetition* and *aversion* are always present in some degree to modify and complicate the effects of other conations. Thus both *enforced* and *primitive spontaneous* attention are affected by the hedonic tone which is created. We have noted, for instance, as an example of *enforced* attention, the effect of a bright light. Such an object compels attention. Yet, Professor James writes: "The infant notices the candle flame or the window, and ignores the rest of the room, because these objects give him a vivid pleasure." [1] This, however, is not out of harmony with the statement that a bright light enforces attention, but is merely supplementary to it. To take another example from enforced attention, it was pointed out that a painful organic sensation may obtrude itself upon us. In this case, the pain, having first

[1] *Principles of Psychology*, Vol. II., p. 345.

contributed to compel attention, sets up aversion, a tendency to get away from the object, and we find accordingly a shrinking from the sensation, and a disposition to attend, if possible, to something else.

To take an example from the second variety of primitive attention, moving things seem to attract our attention because of an instinctive tendency to notice them; but, at the same time, a certain amount of pleasure may be derived from the experience, and this awakens appetition, which brings an increment of attention. As we have seen, all our tendencies produce pleasure when satisfied by their appropriate objects, and this pleasure invokes further conation, which means increased attention. The way in which pleasure and pain mingle their conative effects with those of other tendencies is often very complicated. What, for instance, shall we say of the fascination for the terrible and the horrible? There is probably involved here much of both *enforced* and *primitive spontaneous* attention. At the same time the intense excitement is pleasurable, and thus conspires to maintain the attention by way of appetition. But there is much that is painful. This pain on the one hand increases the striking character of the experience, but on the other it involves aversion. There is a tendency to turn away, and this may be strong enough in some cases to conquer the other conations involved.

The effects of pleasure-pain on attention are great and far-reaching. Some writers have been so impressed by them that they have been led to place pleasure-pain in the forefront as the great determinant of attention. The following definition, for instance, occurs in a well-known text-book.

"INTEREST is the name given to the pleasurable or painful feelings which are evoked by an object or idea, and which give that object or idea the power of arousing and holding the attention."

In examining this definition, it will be well to take the case of pleasurable feelings first. It is significant, indeed, that all the examples cited, in this and in many other books, of really interesting lessons refer to cases of

pleasurable feeling.[1] Now let us suppose one of these lessons to be just over. If we ask one of the most attentive pupils whether he enjoyed the lesson, he will probably answer in the affirmative. There was evidently a pleasurable character in the lesson as it affected the majority of the pupils. Without more ado, therefore, this hedonic tone is seized upon as the cause of the attention. But if we examine the matter a little more closely, we shall find that much of the pleasure did not exist *in the first place,* and lead to attention, but was rather a *by-product* of it. If it were possible for a boy to introspect, he would probably declare that to a large extent he did not attend because the lesson was pleasant, but he found it pleasant *in attending.* The pleasure in question is due to the fact that tendencies are aroused by the ideas suggested in the lesson, and find congenial exercise in connection with them.

There is, however, in the view criticised, this much of truth, viz., that the pleasure produced in the way described (as well as any other pleasure, if such there be) conspires to arouse still more attention. But, even here, it produces its effect through conation—through that form which we have called *appetition.* "It may be regarded both as the condition, and as the result of the conative activity in attention. . . . Thus, when we are reading an interesting story, the pleasure arising at each new unfolding of the plot incites attention for the next stage. At the same time the conative activity itself is producing pleasure, not only indirectly by carrying on the attention to new agreeable objects, but—when the conditions of a good story and of a reasonably clear style are satisfied—in a consciousness of successful activity. Feeling and conative activity thus interact in all interested attention." [2]

It is tolerably clear, then, that an appeal to the tendencies of the individual is the first requisite. But the

[1] Thus Mr. F. E. Bolton (*Principles of Education,* p. 666), after telling us that interest "may sometimes be a painful state," goes on to say: "The type discussed in this chapter, however, will be pleasurable states."

[2] Sully, *Teacher's Handbook of Psychology,* New Edition, p. 133.

teacher who succeeds in making this appeal has the further encouragement that additional appetitive conation results from the pleasure produced by the satisfaction of the tendencies originally appealed to. To put the matter in more simple language, when the child has been interested in a given subject, the pleasure produced inclines him to desire to go on with the subject. A teacher in an infant school stopped in her narrative with the words: "But I don't like to talk about these things." Quite spontaneously one of her pupils exclaimed: "I like to hear you all right, though." Surely this sentence indicates the conative effect of pleasure.

But what of *pain*? The definition of interest quoted above was taken from an educational text-book. But we are not told how a lesson may be made painful in order to arouse and hold attention to it. For it must be remembered that, according to the definition, the pain fixes attention on the object which is painful. It is of little use to speak of punishments. For these, by the same law, compel attention *to themselves*, not to the lesson. If what is meant is that we may compel attention to the lesson *by their means*, there is some truth in that. But it is through fear, or through aversion from pain. We produce these conative effects by means of the punishment, and it is these, not the pain itself, which may to some extent determine attention to the lesson.

There is no doubt that pain does arrest attention to the object which it accompanies, or by which it is produced. We cannot avoid attending to what is painful. But this is a case of *enforced* attention—not one of *interest*, as usually understood. And it is to be observed that the pain has, in addition, another conative effect. As we have just noted, it produces *aversion*, which is a conation *away from* the painful object. And it is this *aversion*, not the enforced attention to the painful object, which we utilise when we punish a child for inattention. Our purpose is not to enforce attention to the punishment, though that is an unavoidable preliminary to the production of the strong aversion or fear which we wish to arouse. This, once aroused, however, we have a motive which directs atten-

tion to something else: in other words, the child attends *to his lesson* because he desires to escape further punishment. It is almost needless to add that we should bring such a motive to the forefront only as a last resource.

It must not be thought, because we have adversely criticised a definition which derives all interest from pleasure-pain, that therefore hedonic tone is a small factor in the mental life. On the contrary, it is a most important element of experience. It is the dominant feature in our joys and sorrows, our amusements and our vexations. Its influence in modifying the various instinctive and innate tendencies is incalculable. Punishment and reward owe the power which they possess largely to its agency. It would even be possible to maintain with some show of reason that in the long course of evolution *all* our special instinctive and innate tendencies owe their gradual development to its influence. But we have to deal with the individual *as we find him now.* And we find these tendencies strongly rooted, and working to a large extent independently of the pleasure-pain of the moment. Except in a few exceptional cases, where intense pleasure or severe pain dominates the situation, the hedonic tone is largely in the background. Ready-made conation is the leading factor.

"Let us look at the case of a boy trying to make a toy air-ship. Every step in the construction is of interest to him, because it leads to the fulfilment of his desire, the accomplishment of his purpose. He nails and pastes, not because nailing and pasting are in themselves delightful, but because without nailing and pasting the air-ship cannot be made. Does he desist because he bruises his fingers with the hammer or cuts them with knife or saw? Does a first failure daunt him, or does he start again to repair his mistake? Does he, in fact, bother his head about the quality of the sensations he is experiencing?"[1]

We see, then, that although pleasure and pain have their influence, they do not constitute the dominant feature in what we call interest. "Interest that is educationally valuable, is not that which pleases and amuses

[1] Welton, *The Psychology of Education*, pp. 188, 189.

(though a little such interest is helpful, especially with young children), but that kind of interest which causes effort to be put forth in order to satisfy the hunger for knowledge."[1]

In so far as appetition and aversion influence the direction of attention, we can class this attention with *primitive spontaneous attention.* It is due to a tendency which, though not of a special character like the instincts, is found in every human being and probably in every animal —the tendency to seek pleasure and avoid pain.[2]

(2) With *apperceptive attention* we have already dealt in the last chapter. We have noted that it cannot be accounted for from the cognitive standpoint alone, but that it requires conation behind it. And this conation is of the same nature as that involved in the *primitive spontaneous attention* which we have been studying. *Apperceptive attention,* indeed, is in the first place developed out of the *primitive spontaneous* variety. A good instance of the early stage of that development was cited in the last chapter from Professor Welton's experience. "One of my own earliest remembrances," he says, "is, when three or four years old, cutting open a toy drum 'to see where the noise came from.'" Here is a case in which the *primitive spontaneous* attention (which Professor Welton prefers to call "absorption" rather than attention) is seen developing into the higher *apperceptive* variety.

It is the teacher's business to begin by appealing largely to primitive spontaneous attention, but to lead the children on to the higher form. He must not be satisfied with obtaining mere "absorption." He must use the conations evoked to stimulate intellectual inquiry. "Has not many a teacher found his pupils very intent on his pictures or his scientific practical demonstrations, but at least equally slack in the other parts of the lesson?"[3] "There may

[1] Kirkpatrick, *Fundamentals of Child Study*, p. 176.

[2] Thorndike (in his *Elements of Psychology*, Chap. XX., pp. 309, 310) includes this tendency to seek pleasure and avoid pain under the *instincts.* But this seems to involve an inconvenient stretching of the meaning of the word *instinct.*

[3] Welton, *The Psychology of Education*, p. 241.

even be this absorption in a whole lesson with little or no true attention, if the pictures, lantern-slides, 'experiments,' or anecdotes be numerous and striking. The intellectual value of such lessons is no greater than that of a cinematograph show. . . . That children should be amused and entertained is right enough in its way: only let us not think it is the same as being taught or trained."[1]

One hears a good deal, in these days, of teaching geography by lantern lessons, and some have even suggested that the cinematograph might with advantage be introduced into the schools. Such means are excellent for arousing a primitive interest. But the teacher must be careful that this primitive or emotional interest, once aroused, leads on to an intellectual one. We wish the children to have not merely a concrete view of the world, but a comprehension of its meaning; they must trace cause and effect in the physical, industrial, and political spheres. And this work cannot be done while the brilliant pictures, rapidly succeeding one another, are completely "absorbing" the children. By all means let us have the pictures as a stimulus, but let us not forget to go on to the more important intellectual considerations which should grow out of them.

For this purpose, we may well divide our lessons rather rigidly into two kinds—emotional and intellectual. Let the lantern lessons be both a stimulus and a reward for the more intellectual work of the "ordinary" lessons. In these latter there should, of course, be illustrations and diagrams. But they should not overwhelm the lessons; they should be subservient to the intellectual considerations. We should always remember that many a common sailor, who has spent his life in voyaging, has "seen" more of the world than the most learned professor of geography. Yet he may understand no more of geography than a farm labourer who has remained at home the whole of his life.

The same clear division between "emotional" and "intellectual" interest should be noted in literature. But here the "emotional" aspect is the more important. We have, it is true, to see that the children get an intellectual

[1] *Op. cit.*, p. 242.

grasp of a poem, and we often require to devote a whole lesson-period to such a task. But the great danger is that the intellectual should crowd out the emotional. The teacher should be ever on the alert to help the boys in their comprehension, he should smooth over the intellectual difficulties as much as possible, and he should try to have many lessons in which the emotional interest is the dominant feature. Much of his success will depend on the selection of the matter. With younger pupils, the passages intended to rouse emotional interest should be simple in idea and expression. A skilful teacher, however, can do much in his preliminary talk on the piece to remove difficulties. Further, it should be remembered that boys can often appreciate and enjoy a piece without understanding the full meaning of every detail.

The growth of the higher or apperceptive form of attention from the lower primitive "absorption" is, after all, only another aspect of the development of the *sentiments* out of the primary instincts and innate tendencies. It is the same thing viewed from the cognitive standpoint.

We have seen in earlier chapters that the primary emotions and tendencies give rise to more complex organisations called sentiments. These are complex growths of emotions and conative tendencies around some object. This means that attention to that object, and to the idea of it, is still more strongly aroused. For an example we may quote Mr. McDougall's words with respect to the early development of the sentiment of parental love from the tender emotion. "Each time the emotion and its impulse are brought into operation by this particular object," he tells us, "they are rendered more easily excitable in the same way, until the mere idea of this object is constantly accompanied by some degree of the emotion, however feeble. *This gives the object a special power of attracting and holding the attention of the parent, who therefore constantly notices the child's expressions*; and these evoke by sympathetic reaction the corresponding feelings and emotions in the parent."[1] But there is not

[1] McDougall, *op. cit.*, p. 165. (Italics ours.)

only increasing complexity on the emotional and impulsive side; all this experience means advance on the cognitive side also. The parent "*constantly notices*" the child and his actions. This surely means that he learns a great deal about him. Although we have spoken of the sentiment as growing up around one object (in this case the child), we must remember that that object is developing also. It soon becomes not *one* object or idea, but a mass of ideas, resulting from constant attention to the child and its welfare. To quote from a former chapter, "As the sentiment develops, this object or idea becomes more complex. As, for instance, the self-regarding sentiment develops, one's knowledge of oneself and of all the relations into which one can enter increases."[1]

We see, then, that as the primitive instincts develop and are organised into sentiments, there is a corresponding development of ideas. The organisation of these means the creation of "apperception masses." The higher or *secondary* form of *spontaneous attention* is therefore *apperceptive.* This *apperceptive spontaneous attention* is at once the most powerful and the most useful form of attention. On the one hand, it involves strong and well-organised conations; on the other, it has at its service rich stores of ideas which facilitate the activity of those conations. Whenever the "object," or an idea connected with it, is presented, there is excited a complex and highly organised psycho-physical disposition. This consists, on the one hand, of powerful impulses which tend to run on for some time, and possibly to surmount many obstacles, before they finally subside to comparative quiescence. On the other hand, this tendency to run on, to play round the "object," is favoured by the rich store of ideas, which enable the "object" to be grasped from many points of view. It is to be added that the whole business—tendencies furthered, mental activity successful—is highly pleasurable, and that the pleasure produced probably increases the conation, and thus renders the attention still more keen.

Now we have seen that the final test of a school's

[1] P. 299.

instruction is the interest which the pupils take in their work, and this is shown most clearly by the number of pupils who evince a tendency to go on with some of their studies after leaving school. The work of the teacher, then, with respect to the school subjects, *is to develop intellectual sentiments around them.* There must gradually arise a geography sentiment, a history sentiment, a love of good literature, and so on. This can only be done if the teacher takes account of the instinctive tendencies and emotions, which the children possess on coming to school, if he appeals to these in the first place, gradually refining and organising them by the matter which he selects, by his methods of presenting that matter, and, above all, by his own enthusiasm for the matter, which will, to a large extent, communicate itself by sympathy to the children. A teacher, for instance, who is not a lover of literature himself will scarcely develop much of the literary sentiment in his pupils.

The teacher must not expect the higher forms before the lower have had their day. He must remember that the young child is largely a creature of sporadic emotions and tendencies. But the same primitive tendencies which determine keen attention to such crude tales as "The Three Bears," "Jack the Giant-Killer," and "Cinderella," will, if carefully nurtured, refined, and organised, bear fruit in sentiments which will bring with them keen appreciation of "Hamlet," "The Merchant of Venice," and "The Mill on the Floss." The same tendencies which induce the child to work hard at his clay-modelling, his paper-cutting, and his drawing, will, with proper development, give rise to interest in machine-drawing, in scientific experiment, and in architectural planning and design.

"*From all these facts there emerges a very simple abstract programme for the teacher to follow in keeping the attention of the child: Begin with the line of his native interests, and offer him objects that have some immediate connection with these.* The kindergarten methods, the object-teaching routine, the blackboard and manual-training work—all recognise this feature. . . .

"*Next, step by step, connect with these first objects and experiences the later objects and ideas, which you wish to instill. Associate the new with the old in some natural and telling way, so that the interest, being shed along from point to point, finally suffuses the entire system of objects of thought.*"[1]

What becomes, then, of the so-called "voluntary attention," with its "effort" to attend to uncongenial material, of which the older text-books speak? Much of it can be accounted for by this *apperceptive spontaneous attention* which we have been studying. "It is true that John resents problems in his arithmetic book, regarding it (not without some show of reason) as a waste of time to find how many pecks of corn a certain number of horses will eat under distressingly complicated circumstances; while he will cheerfully sacrifice a whole afternoon to puzzle his way through some arithmetical quibble at the end of his *Youth's Companion* or of his *Boy's Own Paper*. Yet, if by any means the teacher can rouse interest in those unfortunate animals, the arithmetical beasts at once get John's fullest voluntary attention."[2]

The interest or conation which is involved in a strong sentiment will spread to all kinds of things which are seen to be intimately connected with the proper objects of that sentiment. "*Any object not interesting in itself may become interesting through becoming associated with an object in which an interest already exists. The two associated objects grow, as it were, together: the interesting portion sheds its quality over the whole; and thus things not interesting in their own right borrow an interest which becomes as real and as strong as that of any natively interesting thing.*"[3]

"Voluntary attention," as usually understood, is attention to something which is not interesting in itself, for the sake of some end which *is* interesting. It is gradually developed from primitive spontaneous attention in the way we have studied. It depends on a *derived* interest. But the interest may be as real and strong as if it had

[1] James, *Talks to Teachers*, pp. 95, 96.
[2] Adams, *op. cit.*, p. 264. [3] James, *Talks to Teachers*, p. 94.

arisen in the thing itself. And the attention may be as spontaneous.

The things which acquire interest in this way are means to an end in which interest is already centred. Although they have no interest in themselves, they are often seized upon, *when the interest in the end is strong*, with an eagerness which is unmistakably spontaneous. We have already noted many cases in which boys eagerly go through experiences in themselves unpleasant and unattractive because they have a keen desire for some end to which those experiences lead. The teacher should make use of this truth as frequently as possible. He should see that the boys have a strong motive for their work. Education is constantly in need of the development of derived interest. Professor Ribot gives the following excellent example:—

"A child refuses to read; he is incapable of keeping his mind fixed on the letters, which have no attraction for him; but he looks with avidity upon the pictures contained in the book. 'What do they mean?' he asks. The father replies: 'When you can read, the book will tell you.' After several colloquies like this, the child resigns himself and falls to work, first slackly, then the habit grows, and finally he shows an ardor which has to be restrained. This is a case of the genesis of voluntary attention. An artificial and indirect desire has to be grafted on a natural and direct one. Reading has no immediate attractiveness, but it has a borrowed one, and that is enough. The child is caught in the wheelwork, the first step is made."[1]

This is perhaps an optimistic account. It presupposes a very strong interest, and one which will hold on its course continuously through much uncongenial material—a rare thing with young children. It represents, nevertheless, the kind of thing which the teacher should attempt. When, however, the ultimate end awakens little interest, or when, as is often the case with young children, the interest slackens under stress of circumstances, or is in

[1] Ribot, *The Psychology of Attention*, English Trans., p. 38.

danger of giving place to other attractions, some more proximate, though more external, interests must be aroused to act as spurs at frequent intervals. Reward and punishment, praise and blame, have their place here.

Given an interest in some end, the best circumstances under which it can illumine what would otherwise be more or less uncongenial means are those in which the means constitute definite progressive steps towards the final attainment. For in such circumstances the means are more or less directly interesting. "If a boy desires to make a successful air-ship, the parts of physics that help him are directly interesting to him. On the other hand, if one reads a book on physics in order to pass an examination, the interest is indirect. The examination might with equal facility have induced a study of geology or of old English literature."[1] The boy who is learning the topography of a district, as a condition of going to visit it on a school journey, will apply himself more spontaneously than if he were doing the same thing for a prize, even if we suppose that the same amount of interest is evoked by the latter prospect as by the former. This is what Professor Stout means when he says: "In education the teacher should, in the first place, aim at making voluntary attention implicit rather than explicit. Here the selection of ulterior motives for attending is important. The motives should have as much connexion with the subject-matter of the lesson as possible."[2]

But, whether there is such organic connection or not, the means will be illumined if only the motives aroused are strong enough, and the pain of effort will not be felt. The boy who dawdles over a set of sums given as homework for which mere marks are to be obtained, getting only half of them right in two hours, might obtain correct answers to all of them in one hour at an important examination in which a prize is offered for the best results. Now, here the means are the same in both cases. We may take it that they are in themselves more or less

[1] Welton, *The Psychology of Education*, p. 195.
[2] *Groundwork of Psychology*, p. 52.

distasteful. To get attention to them, therefore, a tendency for something else, to which they form an essential step, must be aroused. We could thus include both instances under the head of "voluntary attention," as that term is usually applied. But a glance at the boy at work in each case would be sufficient to make one aware of a vast difference. In the one case, there is disagreeable effort the whole time. In the other, the keenness is so great as to warrant us calling the process *spontaneous*. It is true that several tendencies are at work here—the craving for the prize, the spirit of rivalry, the force of imitation, etc.—and that each conspires to keep the others active. It is true, also, that the conditions are highly favourable to continued application—absolute quiet, the ticking of the clock warning that time is flying, the absence of any attractive objects to lure attention away, and so on. But the great difference between this case and the other is that here conation has been stirred to its hightest pitch. A powerful conation so transfigures the means that they are seized upon without any appreciable conflict.

Now what of the attention of the boy to his home-work? That also may be explained to some extent on similar principles. But, as we have just seen, there is one great difference. The idea of marks does not arouse a conation which is powerful enough to carry the business through efficiently. If the boy were as keen on getting his marks as he is on gaining the prize and acquiring distinction at the examination, we should see something of the same spontaneity in his attention. He has *some* keenness. Otherwise he would throw up the whole affair. But his conation is not strong enough to overwhelm all others. Other conations or interests from time to time wax stronger than that which is directed to the obtaining of his marks. And, when there is no other motive for application (as, for instance, the presence of the teacher, or the sight of other boys setting a good example), it is only by a *volition* that they can be overcome. This process of volition has already been described in the chapter on the will. The additional force necessary to overcome the

counteracting tendencies is derived from the self-regarding sentiment. The boy reflects, "I shall be in disgrace," or "Father will be angry with me," or, if his self-regarding sentiment is still more highly developed, "I ought to be ashamed of myself." New force is obtained, and, for a time at least, attention proceeds in the path of duty.

But this additional force is a new factor. The imported conation, it is true, is still an interest, though one of a wider and more comprehensive kind. *Some* interest or tendency must always be aroused. But there is a great difference in the case under consideration: the interest does not arise in the object itself, nor to a sufficient extent in any other object closely connected with it; it has to be derived, partly at least, from the self-regarding sentiment. In so far as this is the case, we have what is known as *volitional attention.* But even this can approximate in keenness of application to spontaneous attention. It may, indeed, be considered as a spontaneous variety founded upon the conations of the self-regarding sentiment. For when the self-regarding sentiment is strong and well-developed, it makes its influence felt throughout all other fields. Interest flows over readily from it to any task which is recognised as part of duty, struggles are short and sharp, and application is kept steady and keen. This is the more possible because, when once we bend to a task, *some* interest is usually developed in the task itself. Spontaneous, as well as enforced attention, comes to the help of volitional. "Pitch in and interest follows. No one will ever get up a white heat of interest by waiting for interest to come before beginning a task."[1] Further, having once made its end our own, we speedily develop some additional conation in it. For, if no other instinctive tendency is developed, the instinct of pugnacity is brought into play. Having begun, we are incited to struggle through to the end.

It is hardly necessary to point out that *volitional*

[1] F. E. Bolton, *Principles of Education*, p. 695.

attention is also *apperceptive*. No *continued* and concentrated attention to one object could be otherwise. It differs from *apperceptive spontaneous attention* in that the conations arising in connection with the "apperception mass" are not sufficient to support the process, but have to be reinforced from the self-regarding sentiment. But the "apperception masses" are still essential. I may make the biggest effort in the world to follow a philosophical argument, but if it is completely beyond me, if I have not sufficient ideas to comprehend it, my attention will soon fail.

As we have already noted, much confusion exists in ordinary text-books with respect to the use of the word *voluntary*. Most frequently *voluntary attention*, as described in those books, covers both the volitional type, just dealt with, and that spontaneous attention which is due to derived interest. But these are clearly distinguishable. In the latter case, the attention may be as spontaneous as when the interest is direct or primary. But in the former case, the interest is insufficient, and has to be supplemented by an appeal to the self-regarding sentiment. It involves *volition*. Again, the word *voluntary* is sometimes used to cover all attention which depends on organised tendencies, sometimes specialised to mean only *volitional*. If used in the former sense, it would include ALL *spontaneous attention*, both *primitive* and *apperceptive*, as well as *volitional attention*. If used in the latter sense, it is superfluous, for we already have the word *volitional*, and this is unambiguous. If the word *voluntary* could be freed from confusion with *volitional*, we might use it to cover all cases in which specific conations are aroused and are sufficient to determine attention without resort to *volition*. But, as this cannot be done, in view of the large amount of literature which exists, and which uses the word to include *volitional attention*, it is better to avoid confusion by dropping the word *voluntary* and substituting *spontaneous*.

III. We come now to the classification of forms of attention *according to the nature of the conations involved*.

But in dealing with attention from the cognitive point of view we have already found it necessary to refer very fully to the kinds of conation involved. It only remains, therefore, to sum up our results.

We have found that *apperceptive* attention springs out of, and is consequently continuous with, *primitive spontaneous* attention. From the point of view of conation, therefore, these two must be classed together as *primitive* and *acquired* forms of one great class—*spontaneous attention.*

But the apperceptive or "acquired" variety of spontaneous attention may itself be divided into two kinds according as the interest in the object is *immediate* (*e.g.* an interest in cricket) or *derived* (*e.g.* an interest in a railway time-table). It is often impossible in practice to distinguish clearly between these two kinds. But it is important to recognise them. The teacher must depend very largely on the direct or immediate form in the earliest stages. But very early in its career, nevertheless, a child can be got to attend to a thing which is uninteresting in itself for the sake of some end which *is* interesting. Here, as we have already noted in dealing with previous examples, there are two clearly distinguishable kinds—(1) those cases in which there is some real or "organic" connection between means and end (*e.g.* attention to physics in order to make an air-ship), and (2) those cases in which the means are not "organically" connected with the end but are merely a necessary condition of its attainment (*e.g.* attention to physics in order to pass an examination). The former may be termed cases of *organically* derived interest; the latter, cases of *conditionally* derived interest.

So much for *spontaneous* attention. But we have seen that the higher forms of apperceptive attention sometimes require the co-operation of a new conative factor, drawn from the self-regarding sentiment. And we have distinguished such cases under the name of *volitional* attention.

Further, we have to take note of the *enforced* variety of primitive attention.

We thus have three main kinds, which can be sub-divided as follows :—

- Attention
  - Enforced
  - Spontaneous
    - Primitive
    - Acquired
      - Immediate
      - Derived
        - "Organically" connected with the immediately interesting object
        - "Conditionally" connected with the immediately interesting object
  - Volitional
    - Explicit
    - Implicit

The sub-divisions under "volitional" remain to be explained. In describing *volitional* attention, we noted that when the additional motive (derived from the self-regarding sentiment) is strong, it pervades the whole process so fully that application to the task may approximate in keenness and steadiness to the spontaneous variety. This would be a case of *implicit* volitional attention. When, however, the additional motive is not strong enough to influence the whole process implicitly, but the idea connected with it requires to be brought to the surface in order to renew again and again the conative force connected with it, as when the boy has continually to repeat to himself, "I shall be in disgrace," or "Father will be so angry," we have a case of *explicit* volitional attention.

Although such classifications as this may help to clarify one's ideas on the subject, they will do more harm than good if they lead to the belief that these "kinds" of attention are absolutely distinct. In our description of them we have tried to show how they shade one into another. Further, several kinds are usually active together, so that it is sometimes difficult to characterise the attention of any given moment as being definitely of one kind rather

than of another. It would be both interesting and profitable to the student to examine the descriptions of various types of attention found in other books, and to classify them according to the scheme here presented.

As we have already noted, the teacher should appeal principally to spontaneous attention. He must get to know all he can of the tendencies of his pupils, so that he can arouse and develop them by presenting the appropriate objects. Then his business is gradually to build them up into sentiments, organised around the various branches of knowledge. There is little doubt that the best work is done by those scholars who have a real liking for the subject which is being studied. And in adult life the same is true. We sometimes wonder at the immense amount of application displayed by a great scholar in the preparation of some monumental work. And many are inclined to think that great *volition* must have been required. They make the common mistake of considering the work from the point of view of *their own* tendencies. In the majority of cases little volition was necessary: the man was fired by an intense enthusiasm for his subject. He did not have to make up his mind to do it. It would be nearer the mark to say that he could not help doing it. As Professor James remarks: "One often hears it said that genius is nothing but a power of sustained attention, and the popular impression probably prevails that men of genius are remarkable for their voluntary [*i.e.*, according to the terminology of this book, *volitional*] powers in this direction. . . . The sustained attention of the genius, sticking to his subject for hours together, is for the most part of the passive [*i.e.*, according to our terminology, *spontaneous*] sort. . . . The subject of thought, once started, develops all sorts of fascinating consequences. The attention is led along one of these to another in the most interesting manner, and the attention never once tends to stray away."[1]

But even when the fullest use is made of spontaneous attention, there will always remain many things to be

[1] *Talks to Teachers*, pp. 101, 102.

attended to, which have neither direct nor derived interest. We cannot in all matters imitate the genius. "He breaks his engagements, leaves his letters unanswered, neglects his family incorrigibly, because he is powerless to turn his attention down and back from those more interesting trains of imagery with which his genius constantly occupies his mind."[1] The teacher, however, has to train *citizens*, men who will be able and willing "to perform justly, skilfully, and magnanimously, all the offices both private and publick of Peace and War." Such men will have to attend to, and perform, many things which their natural inclinations would not lead them to deal with. They will often have to do things which are "against the grain." And in view of this, it is necessary for the teacher to see to it that the power of volitional attention is developed.

The children must gradually acquire habits of self-control. They must, little by little, be led to see the necessity of making efforts to face the uncongenial, even when there is no congenial consequence immediately following to spur them on in their attack. Only the individual, who could claim that his inclinations always corresponded to the needs of the moment, would have the prerogative of relying exclusively on spontaneous attention. But few if any individuals can claim this. We have therefore to form habits of applying ourselves to tasks which we recognise as necessary, though we cannot always trace any close connection between the tasks and our own immediate personal welfare. Habits of this kind will often tide us over many difficulties in which we should cut sorry figures if left to the mercy of our momentary inclinations.

In this kind of habit formation, Professor James advises us: "*Keep the faculty of effort alive in you by a little gratuitous exercise every day.* That is, be systematically ascetic or heroic in little unnecessary points, do every day or two something for no other reason than that you would rather not do it, so that when the hour of dire need draws

[1] *Op. cit.*, p. 103.

nigh, it may find you not unnerved and untrained to stand the test."[1] It is almost unnecessary to remind the reader that this applies to *attending* as well as to *doing*, that, indeed, the latter is really a case of the former. But, as we have already noted, such care to secure opportunities for efforts of will is not necessary in most cases. For there are plenty of occasions in the course of school work, even in those schools in which the doctrine of interest has the greatest influence, when natural inclination does not coincide with the needs of the moment. Let the teacher, therefore, make the school work as interesting as possible. The only caution to be given is that he is not to be beguiled by this doctrine into the flabby pedagogy of soft options, which insists that the moment a thing is not interesting to the child it must be dropped. Punishment and reward, praise and blame will often be required at such moments to induce the child to face the uncongenial. And, as we have already seen, these educational means are not only necessary to cause the child to form a habit of making efforts "against the grain," but they play an important part in the full development of the self-regarding sentiment on its altruistic side.

Although, therefore, we begin with young children by appealing almost completely to their instinctive and innate tendencies, and although we endeavour so to develop these that they become organised into sentiments around much of the school work, we have to remember that as the child grows older the distinction between play and work must become ever clearer. It is a healthy distinction which persists throughout life. And the neglect of it will have direful results. "I know cases in which parents have deplored the final ruin of their child's education at its Higher School and for its future life, from its having drunk in as gospel, at a so-called Kindergarten institution, this deadly error, viz. that in a truly human education a child should not be able to distinguish whether it is at work or at play."[2]

[1] *Principles of Psychology*, Vol. I., p. 126.
[2] Rev. C. D. Dupont, H.M.I., quoted by Winch in his article on *The Psychology and Philosophy of Play*, in *Mind*, 1906, p. 33.

To those who cry out for respect of the child's tendencies, it may be replied that these tendencies are never wholly good. In other words, the tendencies of the child do not, when left largely to themselves, develop in complete harmony with the needs of the society in which he lives. There are, of course, great differences in this respect. Some children possess a nature so much in conformity with the claims of their social environment that little interference from without seems necessary. Others have so many tendencies which bring them into conflict with their fellows that very drastic means have to be taken to modify their nature. But, taking the widest view, it may be said that *every* system of education must ultimately depend on the nature of the child.

All interference with what we call the "natural" development of the child must itself depend on the possibility of evoking some "natural" reactions. It must be remembered that the child, in addition to the specialised forms of reaction which we call instincts, possesses a general tendency to avoid pain and to adhere to pleasure. This general tendency is evoked along with, and modifies the strength and direction of, the more specialised tendencies. In one case, indeed—that of fear—it is difficult to distinguish between general and special. Severe pain not only causes aversion to the course of activity in which it arises, but, whenever the situation is of such a nature as to permit of any attempt being made to avoid it, that aversion readily develops into the impulse to flight with its characteristic emotion of fear. And this more specialised instinctive tendency is liable to be evoked whenever the situation recurs, whether in reality or in idea. Such play of tendencies is quite as "natural" as any other. It occurs to some extent in the child's life, even when the educator does not interfere. In the early rewards and punishments which we mete out, we are thus only making use of "natural" tendencies, and our interference cannot, therefore, be considered wholly artificial.

It is important to consider what will be the state of the other tendencies after our interference. Education is con-

cerned, before all else, with the development of these tendencies. If the consequence of our interference is merely to develop fear of punishment and love of reward, leaving the other tendencies in a worse condition than that in which we found them, we have made a serious and irreparable mistake. This mistake has often been made in the past, when rewards and punishments were sometimes abused, especially the latter, which was by some considered to be the chief means of securing application. If, however, our judicious pushing by punishment does not merely lead to a dislike of pushing, but awakens the child to a truer sense of his position in society, and if our skilful luring by reward does not merely result in a liking for being lured, but also develops some interest in the things to which the child is lured, thus enabling the more altruistic side of his nature to grow and flourish—and these results can usually be obtained, if the means in question are not abused—we are justified in making use of what are in some quarters considered obsolete weapons of education. It is only in certain articles, written by those who are more or less detached from the actual work of teaching, that these cruder means are ignored. The practical teacher, whether he admits it or not, usually finds the necessity of them.

As Mrs. Mumford says, "it is possible to *over*-recognize a child's individuality. We cannot allow a boy of 12 to give all his time to reading and study, poring over his books, and neglecting friends and games and physical exercise, simply because he is following his own bent. The boy who is by nature a bully cannot be allowed to bully unchecked. The girl who is by nature vain and selfish must learn to think of others. We cannot allow the children to ride rough-shod over us simply because in so doing they are exercising their natural impulses! Our aim is to combine a recognition of individuality with the shaping of the child's character according to the ideal ends of the society in which he lives; to help him to develop himself, even through some repression of self. . . . We must find the happy mean between repression and development, and we must above all understand the

children and their standpoint."[1] As we have tried to show, even in repression we are still working by means of the child's natural impulses: we change his environment in such a way that certain tendencies (fear and aversion from pain) are evoked in sufficient strength to modify others.

American psychologists are fond of referring to *interest* as "the felt value of an end." Thus Dr. Dewey says: "The root idea of the term seems to be that of being engaged, engrossed, or entirely taken up with some activity because of its recognised worth."[2] And De Garmo says: "More precisely, it is a feeling of the worth, to the self, of an end to be attained."[3] At first sight these definitions may appear to differ from the meaning which we have attached to the term. But a little consideration will make it evident that conation is the fundamental idea underlying such definitions. To feel the value of an object, or end, we must have a conation thereto. The "feeling" referred to consists of the emotional and affective accompaniments of the impulse excited. Both the writers referred to specify more definitely in other places that it is this conative activity which is the core of interest. Thus De Garmo says: "Interest is therefore dynamic in character. It has its primary root in inherited impulse."[4] And Dr. Dewey tells us: "In this primitive condition of spontaneous impulsive activity we have the basis for natural interest . . . In the selective or preferential quality of impulse we have the basis of the fact that at any given time, if we are psychically awake at all, we are always interested in one direction rather than another."[5]

Our attention, then, is pre-eminently due to the nature of our tendencies, instinctive and acquired. This is what is meant by saying that attention is determined by

[1] *The Dawn of Character*, p. 205.

[2] *Interest in Relation to Training of the Will*, edited by Findlay (Blackie & Son), p. 91.

[3] *Interest and Education*, p. 28.

[4] *Op. cit.*, pp. 18, 19.

[5] *Interest in Relation to Training of the Will*, p. 93.

interest. "When and how a pupil attends is a matter of instinct and habit; there is no royal road to winning attention, but only the regular highway through the development of interest and the reward of acts of attention by some increment of satisfaction to the pupil."[1]

To the teacher who asks for a general formula to enable him to gain the attention of his pupil, we can only say: Get to understand how his mind works and act accordingly. The so-called "natural" teachers approximate to the right methods of appealing to children because they are able to see things from the child's point of view, in other words, because they have deep sympathy with children. This sympathy is the most valuable gift which a teacher can possess. But *all* teachers, whether they possess this gift in great measure or not, will be more successful in securing the attention and co-operation of their pupils by studying the general features of mental processes and the way in which they develop, and by observing as minutely as circumstances permit those concrete instances of these generalisations, and the variations thereof, which they find around them in each of their pupils.

It should now be obvious that the securing of attention to one thing rather than to another, and the means whereby that attention is obtained, are the all-important questions for the educator. Attention may be called the growing-point of mind. It sums up the whole past life and character of the individual, and it largely determines what that life and character shall be in the future. What the child will attend to when he becomes a man is largely dependent on what we get him to attend to now, and on how we induce him to give that attention.

Questions on Chapter XVI.

1. Give a short account of the several varieties of attention and compare their educational value.

2. On what does a close and sustained attention depend?

[1] Thorndike, *The Principles of Teaching*, p. 105.

3. In what aspects does early attention differ from later? What differences in the mode of instruction are necessitated by these differences?

4. Explain fully why it is necessary in the case of young children (1) to make the lessons short; (2) to introduce a variety of illustrations and of treatment generally.

5. How does the power of concentration differ in the case of a child of five or six, and that of a youth of sixteen?

6. What is meant by a "*habit of concentration*"? What is its educational importance, and how can it best be secured?

7. What are the various meanings of the term *voluntary* as applied to attention? Suggest other names which avoid confusion between these meanings.

CHAPTER XVII.

RECENT DEVELOPMENTS IN PSYCHOLOGY.

THE psychology expounded in the preceding chapters is descriptive and general. It aims at sketching the nature, development, and functioning of all human minds of comparatively normal type. Though it recognises that there are differences between mind and mind,[1] it confines itself to the general principles exemplified in all.

But in recent years there has been an increasing demand for the scientific study of these differences. The reasons for this are not far to seek. On the one hand, the continued development of specialisation in commerce, industry and the professions, combined with the requirement of higher standards of efficiency in these occupations, has made it more and more necessary to discover what our pupils are individually best fitted to do. And, on the other hand, the rigidity and excessive elaboration of the system of mass-instruction, under which all the pupils are perforce treated as practically alike in their powers, have brought about a reaction in favour of more individualistic treatment. "And thus at last an independent branch of mental science, 'differential' or 'individual psychology' was founded and named."[2]

The "new" psychology, as we shall see, provides many opportunities for experiment and the application of mathematics. Perhaps this fact in itself is another reason for the rapidity of recent developments. Broadly speaking,

[1] See, for instance, pp. 8-12.

[2] Dr. Cyril Burt in *Psychological Tests of Educable Capacity*, Board of Education, p. 2.

we may say that among students there are two types of mind—the assimilative, reflective and philosophical, disposed to be satisfied with the clarity and precision of a well-ordered, if incomplete, system of truth; and the more active, experimenting, scientific and mathematical intellect, ever on the alert to grapple with new problems and to arrive at new results. Both have their places and functions in the great sphere of knowledge and endeavour. But whereas the old psychology offered a field for the activities of the former, the new developments have attracted the experimenter and the mathematician.

Indeed, it would appear that the older psychologist is in danger of being crowded out. And it becomes necessary to insist that, while much may be expected from the activities of the present—especially from what are known as *mental tests*—the older psychology still stands firm, being in fact the rock on which the new constructions are based, and to which these are, at the best, but supplementary

Although experimental and mathematical inquiry has advanced by leaps and bounds under the inspiration of the study of individual differences, it is well to remember that attempts at this kind of work began while psychology was still general in character. It had long been felt that the application of experiment with its attendant measurement and mathematical calculation was necessary, if psychology were ever to emerge from the descriptive stage and take rank among such exact sciences as physics, chemistry, and astronomy.

But mental elements are intangible. "Space magnitudes we soon learn to determine exactly, because we only measure one space against another. The measure of mental magnitudes is far more difficult."[1] These can only be measured indirectly—*i.e.* by the measurement of some external, material phenomena with which they are connected and by which we can gain some evidence as to their magnitude.

[1] Wundt, quoted by James, *Principles of Psychology*, Vol. I., p. 535.

This proviso must be kept in mind throughout. The whole history of this department of investigation will show that the very perfection of our means of physical measurement—of apparatus and of mathematical formulae—has lured many scientific and statistical minds into the work of measurement in this field without due caution as to the intangible and complex products which they were assumed to be measuring. There has been a great passion for measurement without an equally intense anxiety to define what exactly was being measured.

As far back as 1860, "Professor G. T. Fechner, of Leipzig, a man of great learning and subtlety of mind, published two volumes entitled 'Psychophysik,' devoted to establishing and explaining a law called by him the psychophysic law, which he considered to express the deepest and most elementary relation between the mental and the physical worlds. It is a formula for the connection between the amount of our sensations and the amount of their outward causes."[1]

The German mind is nothing if not systematic, and it seemed to Fechner and to his successor, Wundt, that, since sensations are the simplest elements of mental processes, "the problem of measuring the magnitude of *sensations* is the first step in the bold enterprise of making mental magnitudes altogether subject to exact measurement."[2]

By the help of special apparatus, it was found that every stimulus must reach a certain intensity before any appreciable sensation occurs. This point is called the *threshold* or *liminal intensity* of sensation. When this is passed, an increase of the stimulus does not necessarily cause an appreciable increase in the intensity of the sensation. The increase of stimulus, to produce a definite increase in the corresponding sensation, must bear a certain proportion to the preceding and lesser stimulus. And the ratio is constant within the same field of sensation, *i.e.* when the first of two stimuli is already at great intensity, the second, in order to be accompanied by an appreciable change in the intensity of the corresponding

[1] James, *op. cit.*, pp. 534-5. [2] *Op. cit.*, p. 535.

sensation, must be proportionately greater than the first. In other words, it is not any fixed amount added to a stimulus which makes us notice an increase in the corresponding sensation: the amount depends on how large the stimulus already is. An ounce weight added to a two-ounce weight already resting on my hand will give rise to a definite increase in my sensation of pressure. But the same ounce weight added to a pound will not lead to any corresponding mental change. The ratio of increase of stimulus necessary to produce an increase of sensation has been worked out for each sense, as follows:—

Sensation of light...	$\frac{1}{100}$
Muscular sensation	$\frac{1}{17}$
Feeling of pressure, ,, ,, warmth, ,, ,, sound	$\frac{1}{3}$

The smaller the fraction, the greater is said to be the *discriminative sensibility*. The fraction given for pressure varies for different parts of the skin, being smaller in certain very sensitive regions. Thus the discriminative sensibility of the finger-tip is twice that of the shoulder-blade, the fractions being respectively $\frac{1}{6}$ and $\frac{1}{3}$.

This law of the increase in stimulus necessary to produce increase in sensation was first discovered in special cases by Ernst Heinrich Weber. It is hence usually referred to as *Weber's Law*. But since Fechner first extended its application to all departments of sensation, it may also be called *Fechner's Law*.

It should be noted, in the first place, that this law is true only within certain limits. Above a certain point, any further increase in the stimulus produces no appreciable increase in the sensation. But, further, it gives no help in the direct measurement of sensations themselves. It merely indicates "that the whole of the stimulus does not seem to be effective in giving us the perception of 'more,' and the simplest interpretation of such a state of things would be *physical*. The loss of effect would take place in the nervous system. If our feelings resulted from a condition of the nerve-molecules which it grew

ever more difficult for the stimulus to increase, our feelings would naturally grow at a slower rate than the stimulus itself. . . . Weber's law would thus be a sort of *law of friction* in the neural machine."[1] In short, the whole idea of measuring sensations remains a mere mathematical speculation, and no human being has ever used the numbers computed to reach any valid result.

The concluding remarks of James on this subject are worthy of repetition. "The only amusing part of it," he writes, "is that Fechner's critics should always feel bound, after smiting his theories hip and thigh and leaving not a stick of them standing, to wind up by saying that nevertheless to him belongs the *imperishable glory* of first formulating them and thereby turning psychology into an *exact science*."[2]

The tenor of these remarks is appropriate not only to Fechner's work, but to much subsequent endeavour in which experimental and mathematical enthusiasm has outrun psychological insight. In recent times, indeed, many have rushed into the field of experiment and research without sound psychological preparation. Some can scarcely claim to be psychologists at all; they are, in fact, statisticians, eager to be among the first investigators, but in too great a hurry to define clearly what they propose to investigate.

And even some whose psychological knowledge is undoubted have fallen into the same unreflective procedure. Dr. P. B. Ballard, for instance, one of the foremost of modern investigators in this field, commences an inquiry into "The Limit of the Growth of Intelligence" with the words: "I begin by assuming that the term 'Intelligence' has an accepted meaning. Deferring a closer definition to the last section I meanwhile use the term as meaning that form of mental ability, whether simple or composite, which is measured by modern mental tests."[3] The latter sentence is equivalent to stating that 'Intelligence' is what the inquirer in question, in common

[1] James, *op. cit.*, p. 548. [2] *Op. cit.*, p. 549.

[3] Ballard, *The British Journal of Psychology* (*General Section*), Vol. XII., Part 2, Oct., 1921, p. 125.

with other investigators, is engaged in measuring. It gives us no definite information. Fechner, at any rate, did tell us what he proposed to measure—sensations—though he failed to do so. But, since Ballard's first sentence implies that the term "Intelligence" has an accepted meaning, we naturally turn to the last section in which this "closer definition" is, according to the author's promise, expected to appear. Here, however, we read, with respect to thirteen statements of the meaning of "Intelligence," sent in by leading investigators in America: "No common nucleus of meaning is discoverable, unless it be that Intelligence is something that is measured more or less exactly by Binet's scale[1] and by the American Army tests. Nor do the views of European psychologists show much more unanimity."[2]

In fairness to our author, however, as well as for the benefit of the reader, it is only right to give the conclusion of the investigation. This reads as follows: "The probability being that intelligence is a composite thing, and means more than synthetic power, then the most that can be claimed as the outcome of my investigation, is that, given a normal environment, a certain factor of intelligence—the power to integrate experience—arrives at maturity when the subject is sixteen years of age or younger. How far this factor correlates with the other factors—if there are other factors—this investigation does not show."[3]

We see, then, that even at the end of the investigation, Dr. Ballard is not clear as to what is the exact nature of the "Intelligence" which he assumes he is measuring. He claims, however, that what he has measured is "the power to integrate experience," but he is uncertain as to whether this is the whole of the "Intelligence" which he proposed to measure.

Now there is little doubt that "the power to integrate experience" is equivalent to what we have described in the chapter on Reasoning.[4] But when we come to examine

[1] See pp. 382 ff.

[2] *Op. cit.*, p. 141.

[3] *Op. cit.*, p. 138.

[4] Chapter IX.

Ballard's tests, we find that they do not cover the whole field of reasoning. They are entirely *deductive* in character. This is a necessary consequence of the nature of the tests. They consist for the most part of absurdities which can be criticised as such in the light of common experience and *independently of any specialised knowledge.* As Dr. Ballard himself writes, "all the elements of knowledge requisite for a solution are just as familiar to the youngest testee as they are to the oldest."[1] Below are the instructions to the subjects of the experiment, together with a few of the tests.

> Some of the following sayings are sensible and some are foolish, and you must say which of them are sensible and which are foolish. Do not write out the saying, but simply put its number on your paper and write after it the word "sensible" or "foolish." If you write the word "sensible," you need say nothing more; but if you write the word "foolish" you must give a reason for your opinion.

SECTION A.

> (1) A soldier writing home to his mother said: "I am writing this letter with a sword in one hand and a pistol in the other."
>
> (2) It is said that a certain town in Greece contains two relics of St. Paul; one his skull when he was a boy, and the other his skull when he was a man.
>
> (3) An old gentleman complained that he could no longer walk round the park as he used to: he could now only go half way round and back again.

These tests—34 in all—were given to some hundreds of people in schools and colleges, of ages varying from 11 upwards, the conditions being similar to those of an examination, with the exception that there was no time limit. They were marked by Dr. Ballard in accordance with a key, which gives in each case the right and, where necessary, the wrong kind of criticism. Thus, for the first three absurdities we find the following.

[1] *Op. cit.*, p. 140.

KEY.

1. *Right:* "He had no hand free for writing." "Both hands occupied," etc.
   Wrong: "He couldn't write with a sword."
2. *Right:* "No man has two skulls." "A man has the same skull as he had as a boy," etc.
3. *Right:* "The distance is the same."
   Wrong: "He was a silly old man."

The number of right answers was calculated for each subject and was taken as giving a measure of his or her "Intelligence."

Even with these three examples of the tests, one might be justified in finding fault. The answers given in the key as wrong are by no means to be characterised in this way. Those giving them may have grasped or "integrated," or apperceived, the situations in quite as thorough a manner as those who produced answers which were accepted. One is forcibly reminded of the inspector who, after writing on the blackboard 47 for seventy-four and 69 for ninety-six, was about to give the acquiescent class up in disgust, when one pupil, probably the most courageous rather than the most intelligent, called out: "I say, Mister, do it with *thirty-three!*"

But let us glance at some of the results. "In a large and good secondary school the averages for the years 11 to 17 respectively were: 18, 18·8, 19·7, 22·6, 22·8, 22·5, 22·3. . . . The maximum score was reached at 15. At another secondary school the maximum was again reached at 15, though there were pupils up to 18."[1]

"At a training college for women 141 students were tested. The average score was 21·1. . . . The results indicate a degree of intelligence well above the average, but a little below the average at a good secondary school; thus confirming an opinion, frequently expressed, that the best scholars from secondary schools do not enter the teaching profession."[2]

But, if Dr. Ballard's results are valid, they indicate still more than this, viz., that the *average* intelligence of the

[1] *Op. cit.*, p. 134. [2] *Op. cit.*, p. 135.

training college is below that of the good secondary school. One may agree that the *best* pupils of the secondary school do not go in large numbers to the training college. But when one is asked to believe that those who do go are as a whole below the average of intelligence, even of a *good* secondary school, one is forced to the conclusion that something is wrong either with these tests or with the authorities responsible for the admission of students to training colleges.

Let us now make one more selection from the statements of results. Dr. Ballard proceeds as follows:—

"The validity of pooling results from such disparate sources is very doubtful; and too much weight must not be attached to the following scores which were obtained by taking all the papers together from all the schools tested in England and Scotland, and finding the average:

Age	11	12	13	14	15	16	17
Averages	13·1	14·4	15·1	17·4	18·5	18·9	18·9

"These norms support the conclusions reached by other investigators. Remembering what has already been said about the tendency of the duller children to fall out of the ranks after fourteen, we feel justified in concluding that the rate of growth of intelligence gradually slows down, and that after sixteen years of age it virtually stops. Indeed there is not much improvement after twelve. It is true that my figures show a fairly large step from 13 to 14, but this is easily accounted for by the fact that the thirteen-year-old's tested were a fairly representative group; while after the fourteenth birthday social and intellectual selection began to operate."[1]

It should be constantly borne in mind that, whatever may be the precise nature of the "Intelligence" the growth of which has been thus measured, it is supposed to be an innate endowment, independent of any *special* instruction or training. It cannot, of course, develop without any educative environment. As we have already seen,[2] the most highly endowed would come to nothing of

[1] *Op. cit.*, p. 135. [2] See p. 106.

intellectual value if isolated from civilisation. But, though much of the growth traced may be due to the development of innate powers under normal conditions, some of it may still be claimed as due to educative influence. It is true that the tests can be understood by all normal scholars of the youngest ages dealt with. But there are degrees of understanding. Ideas become more precise, more clearly related to one another, and are more readily dealt with by frequent and continued thought. And it may be that some of the superiority of the older subjects is thus due to nurture rather than to nature.

The tests just described are often referred to as *group tests*, because they can be applied to many persons at the same time.

It should be noted that they produce both *general* and *individual* results. The aim of the experimenter was to arrive at a *general* result. He desired to find the limit of the growth of innate "Intelligence" in the case of normal British people of the present day. As in any other department of mental or physical activity, there are bound to be individual variations, due to differences in nature and in nurture. But by taking a large number of cases and striking an average, it was hoped to reach a general result, true in the sense that normal individuals under normal circumstances approximate to it.

But, incidentally, the tests produce *individual* results, though these were not the prime objective. In so far as we regard the tests as satisfactory, we may agree that the result in each case gives a measure of the "Intelligence" of the individual concerned.

Now the *total* intelligence of a given individual, whatever this may be found to consist of, must be distinguished from the "Intelligence" which Dr. Ballard has attempted to measure. The former includes the latter, but is much more. Submitting myself to Dr. Ballard's tests, I may show that I possess greater "Intelligence" than the builder whom I summon to deal with a defect in the construction of my house. But this builder, in grappling with the problem, succeeds where I should probably fail. In this particular sphere, his *total* intelligence is greater than mine.

He has spent his life in building and repairing houses and he possesses a large amount of knowledge and skill in which I am lacking. His *total* intelligence in this sphere is the product of both nature and nurture, the latter playing a very important part; my own is little more than that with which nature has endowed me. To take another example, the late Duke of Devonshire, when President of the Board of Education, is reported to have said, in face of some problem connected with the schools: "I am a child in these matters." By this statement, he did not intend to admit any poverty of native "Intelligence." He was merely confessing an ignorance of the educational system which affected his *total* intelligence: whether such a person should be placed in charge of the education of the country is a question which it is not necessary to discuss here.

Ballard, it will be remembered, suggested that what he had measured—the power to integrate experience—might turn out to be only a factor of intelligence. No one doubts for a moment that it is only a factor of what we have just called *total intelligence.* But this includes acquired knowledge and skill as well as the native endowment of intelligence to which Ballard refers as being possibly greater than what he measured. With respect to *total intelligence* in all departments of knowledge and endeavour no test will probably ever be possible. The range to be covered is too great. Not even the acid test of life can reveal everything. But for *total intelligence* in special departments, our ordinary school and college examinations are supposed to provide tests.

It is becoming increasingly important, however, to provide tests of native intelligence. The *total intelligence* revealed by good examinations does not admit of an analysis which would enable us to state how much of it is native intelligence and how much is due to nurture. If a boy gains very high marks in a severe test in mathematics, we assume that he must necessarily possess good native intelligence. But we do not know definitely how much of his success is due to excellent teaching and hard work. And when we are concerned in selecting pupils for advanced

study, we desire to make sure that we are taking those who can most profit by it.

There are some who would say that for the practical purpose of selecting pupils for advanced study, there is little need to attempt to measure this native intelligence. They would point to the experience of the past, which gives many instances of the hard-working, though somewhat dull, plodder out-distancing the brilliant, but unreliable and lazy, student. There is much to be said for this view. But it nevertheless remains true that in many cases it is highly desirable to know how much of the *total intelligence* displayed by a given individual is due to native intelligence and how much to other circumstances. In the higher branches of some studies, it is impossible to succeed without great native intelligence. No amount of resolution and drudgery can force the obstacles aside. And in the lower spheres of education, it is important to avoid misjudgment of pupils. A low degree of *total intelligence* in a given branch may be due to laziness or lack of interest. But it may also be due to low native intelligence; and it may be necessary in such a case to transfer the pupil in question to some other class or school, in which he will get treatment more suited to his condition.

Accordingly, much activity has been displayed during the past few years in devising and improving individual tests of native intelligence.

Before we proceed to describe some of these tests, it may be advisable once again to warn the reader that the term "Intelligence" has at present no definite meaning for psychology. A glance at our index will show that it has not been used previously, at any rate as a technical term, in this book. In the preceding chapters we have described the chief mental processes; but we have not dealt with the variations in the efficiency of these processes which occur in passing from one individual to another. Dr. Ballard, in his investigation, turns out to have measured the efficiency of a form of deductive reasoning. Most thinkers would include more than this under the term "Intelligence." And Dr. Ballard himself suggests that there is more. But many would include the efficiency of

memory, imagination and conception, not to mention still more. In fact, Dr. Burt defines intelligence—"general intelligence," as he prefers to call it—as "inborn, all-round mental efficiency."[1] Professor Spearman prefers to speak of a central factor which he calls "general ability" and symbolises by the letter "*g*," without committing himself to a definite statement as to what it is.[2] He writes, however, that "possibly this central factor is some general fund of mental energy, which again depends upon a general fund of some sort of brain energy."[3] This conception, be it noted, is not out of harmony with Burt's idea of "general intelligence"; it certainly would involve some degree of "all-round efficiency."

It is obvious that there is room here for much discussion and thought, if psychology is to be saved from confusion in this matter. Meanwhile, the demands of practical life must be met. There is a difference in "general intelligence" or "general ability" between one person and another; and though psychologists are not clear as to the precise nature of this "Intelligence," the need of selection and classification presses them to go forward, and apply individual tests.

The pioneer of these individual tests of intelligence was a French psychologist, Alfred Binet (1857-1911). This psychologist was called upon to find means of distinguishing mentally defective children, and he framed a series of increasingly difficult tests, whereby it was possible to pick out readily and classify the intellectual weaklings. His success constrained him to extend his tests in order to make them suitable to the measurement of mental development of ordinary children. With the help of his colleague, Dr. Simon, he examined large numbers of children in the elementary schools of Paris, and standardised his tests in accordance with the results obtained. One of the first consequences of his work was the establishment in Paris of special classes for backward children.

[1] *Journal of Experimental Pedagogy*, I. 95.
[2] *British Journal of Psychology*, V., pp. 51-84.
[3] *Psychological Tests of Educable Capacity*, Board of Education p. 70.

Binet's Tests have been translated into English, have been slightly modified as the result of experience, and are still used to determine the degree of development of intelligence or, as it is often called, the "mental age" of children.

The accompanying table (facing page 384) gives an example of the actual forms prepared by the author and used in a trial of these tests in the year 1913.[1]

The statements of questions and instructions indicate fairly clearly the nature of the tests. In some cases, however, a little further explanation is necessary. In the first test for the mental age of 5 years, the boxes were all alike in appearance. They were large pill boxes, into which sufficient sand and cotton wool had been placed to cause them to weigh the prescribed number of grams, They were presented in pairs, as indicated by the numbers. The fifth test for the same mental age consists in arranging in order the two pieces of an oblong card which has been previously cut across diagonally. On the table is placed as a model a similar uncut card. The two pieces are placed before the child with the sides which formed the diagonal as far removed from each other as possible. The tester should be careful (1) that the child does not fail because he is indolent; (2) that one of the pieces does not get turned over so as to suggest the proper arrangement; (3) that he does not show by a look or other movement whether the child is proceeding rightly or wrongly. The lines referred to in the fourth test prescribed for the mental age of four are two parallel lines, three centimetres apart, the one five centimetres long and the other six centimetres in length. Hesitation must be taken as failure.

The following directions have been given with regard to conducting the tests.

"When confidence is assured, the child's age is ascertained and the tests for that age given: should he accomplish all or all but one, he is adjudged at the level of that age, and is then subjected to *all* the tests of the succeeding ages. If he accomplishes five of these, a year

[1] Dumville, "*A Trial of Binet's Tests on Five-year-olds*," Journal of Experimental Pedagogy, Vol. 2, No. 2.

is added to his level; if ten, two years. But if the child fail in two or more of the tests appropriate to his own age, he is put through the tests of each preceding year in turn until that year is found in which he *can* accomplish all the tests or all but one; he is then subjected to the tests of the ages succeeding the year of his age by birth."

"Judgment is passed at once on the answer, + signifies that the test has been accomplished, — that the child has failed, (?) represents that a doubt exists in the mind of the investigator, and a blank indicates that the test has not been set, no answer is signalled by a zero."[1] In some cases, the writer also used the mark of exclamation (!) to indicate a particularly smart response.

It will be observed that the tests indicated in the accompanying table do not go beyond the age of eight. As the children tested were all of the age of five, it was not considered worth while in this instance to go beyond the mental age of eight. It will be noted, moreover, that the child whose results are shown failed at every test set for the mental age of eight.

But Binet's scale extends to the mental age of 15, and there is a final set of tests for "over 15." This is in striking agreement with the result obtained by Dr. Ballard, viz., that native intelligence, at any rate the factor of it measured by the latter's group absurdity tests, arrives at maturity when the subject is sixteen years of age or younger.

As the result of many trials of these tests, considerable changes have been made in them. The number of correct responses given in each case is a measure of the difficulty of the test. After much experience, it has thus been decided that certain tests were too difficult for normal children of the age for which they were originally arranged and that others were too easy. Thus the fifth test given in the accompanying table for the mental age of three has been found a little too difficult and has been transferred to the age of four, while the first and second tests originally

[1] Miss Katharine L. Johnson, "An English Version of M. Binet's Tests," *Training College Record*, Nov. 1910, p. 90.

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prescribed for the mental age of four have been found somewhat too easy and have been placed among the tests for the age of three. We give below the new arrangement, according to what is called the *London Revision*, for the first three years.[1] It is claimed that the tests are placed in the order of their average difficulty for English children.

AGE THREE.

1. Points to nose, eyes and mouth.
2. Repeats two numbers (one trial correct out of three), *e.g.* 3 7, 6 4, 7 2.
3. Knows own sex, whether boy or girl.
4. Gives name and surname.
5. Names knife, key and penny.
6. Enumerates items in two pictures out of three.

AGE FOUR.

7. Repeats six syllables: "I am cold and hungry."
8. Repeats three numbers (one trial correct out of three), *e.g.* 9 1 4, 2 8 6, 5 3 9.
9. Counts four pennies.
10. Points to longer of two lines.
11. Points to prettier faces in three pairs.

AGE FIVE.

12. Performs a triple order: putting key on table, shutting door, and bringing book.
13. Copies a square recognisably.
14. Repeats ten syllables.
15. Gives own age.
16. Distinguishes morning and afternoon.
17. Names four primary colours: blue, yellow, green and red.
18. Repeats four numbers.
19. Compares two weights in three pairs differing by 9 grammes (*e.g.* 3 and 12 grammes, 6 and 15 grammes).

[1] Quoted from *Psychological Tests of Educable Capacity*, pp. 200.

The limits of this book do not permit of any further details or criticism. For these, the reader is referred to the special treatises on this subject,[1] being at the same time warned that it is futile for anybody to use these or any other psychological tests without a thorough preparation, both theoretical and practical.

Tests of the kinds we have discussed have led on to many others—some of purely psychological import and some of a more practical character.

Dr. Ballard, for instance, inspired probably by Binet's tests for intelligence, has conceived the idea of working out "norms of performance" in the various subjects. "It is surely as profitable," he writes, "to know how long it would take a nine-year-old child to add a given column of figures as it is to know how long it would take a two-year-old horse to run a mile. Yet we have records in the one case and not in the other. Finally there is the need for placing in the hands of the class teacher some means of protection against arbitary and unreasonable criticism by the headmaster or the inspector."[2] He has accordingly worked out a number of tests which, being used in a number of schools, first give us a clear notion of what we may expect from the normal child of a certain age—this amount being called the norm—and then, on being tried elsewhere, are means of measuring how far the new subjects are above or below the norm. Such tests, of course, are of a purely practical character. They are not "psychological tests of educable capacity."

To test mechanical arithmetic, for instance, Dr. Ballard has framed 100 questions which can be put to any class in any ordinary school, the number of right answers being an indication of the stage of progress reached. Fifty minutes are allowed for the whole test. We give below the first four and the last four of the questions.

[1] *Psychological Tests of Educable Capacity* (Board of Education) is specially recommended to the notice of the student, for it gives a good general outline of the whole field.

[2] Ballard, *Mental Tests*, p. 107.

MECHANICAL ARITHMETIC.[1]

Work in your head if possible. Scrap paper allowed.

1. $8 + 5$.
2. $9 + 6 + 8$.
3. $8 + 7 + 13$.
4. $34 - 19$.

97. Area of circle 4ft. diam. ($\pi = \frac{22}{7}$).
98. Area of all the faces of a cube of 2 inch edge.
99. Volume of water in a tank 2 ft. long 2 ft. wide, $1\frac{1}{2}$ ft. deep.
100. Find radius of circle with area of 154 sq. ft.

Similarly for "problem" arithmetic, there are 100 questions, with one hour allowed, as follows:—

ARITHMETICAL REASONING.

Work the following sums in your head.

1. Jane is 18 years old. If Sarah were 5 years older she would be as old as Jane. How old is Sarah?
2. What number is half-way between 12 and 16?
3. A man is taller than his wife by 3 inches; his wife is taller than his daughter by 5 inches. The daughter is 60 inches high. How high is the man?

98. A man walks 5 yards to the north, 5 yards to the east, 5 yards to the south, and then 5 yards to the west. How far is he then from the starting point?
99. If in secretly sending numbers to a friend I agree to write 7 when I mean 3 and 11 when I mean 7, what should I write when I mean 10?
100. The first even number is 2, the second is 4, and so on. What is the hundredth even number?

In English, Dr. Ballard has framed tests for various branches of the subject. We give below a portion of a test of speed in reading *and understanding* a piece silently. There are three pages of close print; 15 minutes are allowed for children and 10 minutes for adults.

[1] These tests are to be found in full in *The New Examiner* (Hodder and Stoughton). Copies can also be bought separately in dozens, at reasonable prices.

SILENT READING (B).

Wherever a number appears there is one word and only one word missing. The word has to be written on your answer paper opposite its proper number.

Jane had two dolls, one with black hair and the other with brown. She liked the doll whose hair was brown, but did not like the doll whose hair was (1).

A little boy was sent to fetch three eggs from a nest and bring them to his mother. On the way back he fell down and broke two of them, so he was able to give only one (2) to his (3).

So far, so good. But in some of the later sections, there are cases in which a thoughtful pupil, without further instructions, might hesitate and lose time. Take, for instance, the following—

> An Englishman and a Frenchman quarrelled, and agreed to fight a duel in a dark room. The Englishman, not wishing to have murder on his conscience, groped his way to the fireplace, fired up the (48) and brought down the (49). In the French version of this story it is the (50) who is made to hide up the chimney.

The keen, unsuspecting pupil, anxious to get done in time and somewhat lacking perhaps in humour, might well put "soot" or even "chimney" for (49) and then be in a quandary as to what to write for (50). Now if it is intended to test the sense of humour and that quickness in solving some puzzles which is in part dependent on it, there is no fault to be found. But if speed of reading and of mere understanding of what is read is the thing tested, this part of the test is unsatisfactory. It puts the serious, unsophisticated mind at a disadvantage where no such hindrance was intended.

Dr. Ballard has also drawn up tests in history and geography. In history the period dealt with is from 1485 to 1914. In geography, the test is on England and Wales. These tests remind one very forcibly of the short tests which all thorough teachers have set, when pressed for time, from the earliest days of organised teaching. The chief novelty seems to be the giving of a large number of

statements with respect to which the pupil is asked to write "Yes," "No," or put a dash, according as he considers them respectively true, false, or doubtful. Here, for instance, are three of these statements in history.

(61) On the whole the Tudors were strong rulers and the Stuarts weak.

(62) The Reformation increased the influence of the Church in state affairs.

(63) The suppression of the Monasteries by Henry VIII. proved of benefit to the poor.

Dr. Ballard holds that the usual examinations in history and geography consist largely in essay writing, and that they consequently test power of expression more than knowledge. There is much to be said for this view. But the comprehensive grasp of a subject is a great deal more than the possession of isolated facts, and with carefully framed questions, mere "fine writing" can be placed at a discount.

The spirit of testing seems to be ever spreading. It is now invading the field of industry, and tests have been devised to determine the fitness of young people for shorthand and typewriting, and for dressmaking. Into the nature of these tests we cannot here enter. They are often referred to as *vocational tests.*

It must be clearly understood that we have only touched the fringe of the subject of mental tests. The reliability of much of this modern work, especially in dealing with groups, is dependent on that branch of mathematics which deals with statistics. To the ordinary plain person, it seems the simplest possible thing, when one has obtained certain numerical results from testing a number of subjects to strike the average and rely upon that as in a sense representing the whole class of persons in question. But in practice, mere averages are often misleading. It is obvious, for instance, that if I take the first twenty men who come out of a railway station and find their average height, I may be very far from the true British average Experience in statistical investigation has led to the discovery of means whereby we can estimate the probable

error. In particular, we may say that in the case of properties which are possessed by human beings, animals, or plants, and which we attempt to measure, it is always found that if we have a good selection to work on, there is a more or less uniform distribution of cases of high, low, and approximately average degrees of the property investigated. The majority of cases cluster around the average, and they "tail off" as we go high or sink low; so that if one attempts to plot a curve of distribution, it is more or less bell-shaped, as in the accompanying figure. This curve is known as the *curve of normal distribution.*

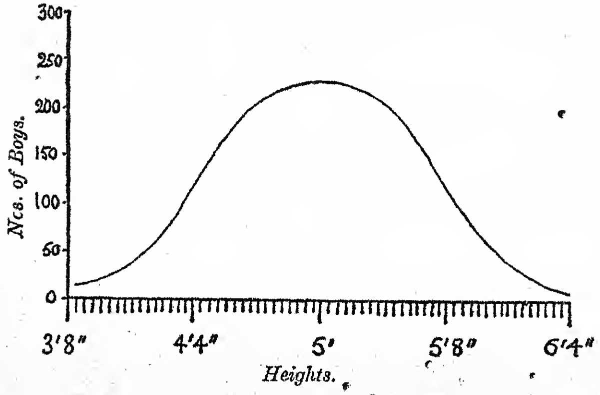

Fig. 21.—Curve showing Distribution of Boys in Secondary Schools of a Large Town according to their Heights (Hypothetical).

Now in our ordinary school examinations, much of what we measure depends on natural aptitude. And if our classes are properly formed, and our examination questions suitable to the stage of progress, the distribution should, at any rate roughly, obey the law just illustrated. Assuming that the class has been properly taught, and has worked satisfactorily, we may say that the "average" pupils can obtain about half marks. Few, if any, should be able, with our questions, to obtain full marks; and

few, if any, should have none at all. Herewith we give a graph prepared from the results of an actual examination in mathematics

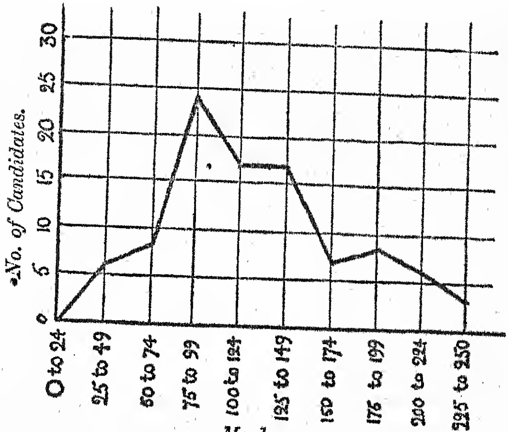

Fig. 22.

It will be noticed that the highest point of the graph is more to the left than in the case of the bell-shaped curve of normal distribution. The reason for this is that the test was a little too difficult for the pupils. If the test had been a little too easy for them, the graph would have been "skewed" to the right instead of to the left. But if the tests were made much too hard or much too easy, very different graphs would result (*e.g.* Fig. 23).

In making a graph for small numbers of testees, such as those of an ordinary class, the teacher should put the children together in groups, each group consisting of all those whose marks come within a certain range, as seen in the accompanying example. It is obvious that with a small number of children and with a large maximum mark (say 100), there would be some cases in which no children obtained certain marks. This would cause the

graph to descend abruptly, and would make it very irregular. But if we take the children in groups, such as those with marks from 1 to 9, those with marks from 10-19, and so on, we ought to get a fairly representative number in each group, and our resulting graph will be tolerably regular. It is only, however, when dealing with a great number of subjects, some hundreds at least, that the graph can be expected to approximate to a smooth bell shape like the ideal one we have shown (Fig. 21).

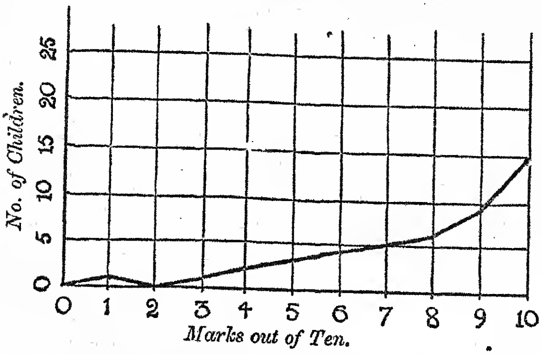

Fig. 23.

Until quite recently many teachers had before them the ideal of full marks for all pupils, or for nearly all. And the graphs obtained were more of the nature of a rising curved line than of a bell shape (Fig. 23). The examinations which resulted in this way were of insufficient difficulty to sort out the more intelligent children. To avoid these unsatisfactory results, and to ensure that a true measure of the stage of progress of *all* pupils has been obtained, teachers should not only set questions of the necessary difficulty, but should check the results by plotting them out in the way described.

Mention should also be made of the use of what is called *correlation* in dealing with the results of group tests. In many experiments with group tests, for instance, efforts

have been made to discover whether there is any connection between one property which has been measured and another which has also been measured with the same testees. If, for instance, I test a class of children for "Intelligence" by using Ballard's absurdities, and if then I give the same class his test in Arithmetical Reasoning, shall I find any connection between the two results? Obviously I ought to do so; for the second ability is a kind of *total intelligence*[1] of which the first is a most important factor. But modern experimental psychologists are not satisfied with mere supposition or speculation. They must have facts, and well-established ones. If the order of merit of my pupils were exactly alike in each case, and if also I were satisfied that there was very small probability of error with regard to the samples dealt with, I should have to conclude that the connection or *correlation* was practically perfect. In such a case the *correlation* would be represented by unity (1). Such a high correlation is, of course, unlikely. If, on the other hand, it should turn out, as is a thousand times more unlikely,[2] that the order of merit in the second case was exactly opposite to that of the first—that the first in one test was last in the other, that the second in one test was last-but-one in the other, and so on, I should have to conclude that there was direct opposition between the two properties measured. This would be expressed by saying that the *correlation* was completely negative (— 1). But in actual practice neither of these suppositions would be realised. The two orders of merit would be different. And the measure of this difference gives the degree of positive or negative correlation. If it is small, we shall have a positive fraction, indicating that there is partial correlation, though it is not complete. (This would be the result obtained in the case in point). If it is large, we shall have a negative fraction, indicating that there is negative

[1] Sometimes called *special intelligence*, to distinguish it from the other, which is often called *general intelligence*.

[2] Impossible, of course, in the case we have instanced. There would be a high degree of correlation in this case. We merely make this supposition to save time by avoiding the trouble of taking an example in which there would be a negative correlation.

correlation, *i.e.* that the two properties measured are to some extent incompatible. But if it is neither small nor great, there is little, if any, correlation and the appropriate numerical representation is in the region of 0. Suppose, for example, that for the second order of merit, instead of using the order determined by the tests in Arithmetical Reasoning, I grade the pupils with respect to the darkness of their hair, putting the one with hair most nearly black first and the one whose hair is most nearly white last. As far as we know—one may, of course, actually experiment on the matter if it is thought worth while—there is little or no connection between general intelligence and shade of hair. If my class is a representative sample in the matter of different shades of hair, there will be a considerable difference in my two orders of merit due merely to chance. This difference will be approximately intermediate between the two extremes we have mentioned, and will indicate a correlation of 0.

The mathematical means of ascertaining (1) that in the case of each order of merit the sample provided by the batch of pupils tested is thoroughly representative of all such pupils (giving a good bell-shaped curve of distribution in each case), and (2) that the numerical index of correlation which the differences in the ranks or orders of merit in the two cases warrant has been exactly estimated, cannot be discussed or explained here. The reader who desires to pursue the subject further is referred to the special books on the subject.[1] We may, however, briefly note how the numerical index or *coefficient* of correlation can be determined. The number indicating the difference in rank of each testee, whether positive or negative, is squared. All the squares thus obtained are added together, the mathematical representation of this sum being $\Sigma(d^2)$. Representing the required *coefficient of correlation* by the letter r, we may give the formula as follows—

$$r = 1 - \frac{\Sigma(d^2)}{\frac{n(n^2-1)}{6}}.$$

[1] *E.g.* McCall's *How to Measure in Education.*

The letter n represents the number of subjects or testees, and the fraction $\frac{n(n^2-1)}{6}$ is the means of calculating the sum of the squared rank differences expected by mere chance. If there were no rank differences at all, the numerator of the fraction in our formula would be 0 and we should be left with $r = 1$. If, on the other hand, there were a totally opposite ranking, it would be found that the sum of the squares of the numbers representing the actual differences in rank was twice the number obtained by substituting for n its actual value in the expression $\frac{n(n^2-1)}{6}$. We should thus obtain—

$$r = 1 - 2 = -1.$$

In conclusion, we may say that the educational world is slowly being aroused to the importance of mental tests. Inspired by Binet's example, some of our education authorities are endeavouring to select pupils on the basis of native intelligence as well as what we have called *total intelligence.* They realise that under the ordinary system of examination such cases as the following are possible:—

> E.F. has gained a Junior Scholarship, owing, probably, to special preparation; his low mental ratio should have eliminated him from the list of awards. His most recent report shows that at the Secondary School he is bottom but five in the lowest form, and his want of success, even in subjects taught in the Elementary Schools, is almost as evident as it is in the new subjects taught at the Secondary School.[1]

And in some cases, tests of native intelligence are being used as supplementary to the ordinary examinations.

Such use of mental tests is entirely practical. It assumes that there is such a thing as native intelligence, it measures that intelligence for practical purposes, but it does not concern itself primarily with the exact nature of the property.

On the other hand, it is to be hoped that the experimental psychologists, by means probably of group tests, aided by the theories of distribution and correlation to

[1] *Psychological Tests of Educable Capacity*, p. 157.

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[1] *Psychological Tests of Educable Capacity*, p. 157.

which we have referred, and guided by careful thought and discussion, may succeed in defining more clearly the nature of this endowment.

* * * * * *

Meanwhile, it is necessary to call attention to a modern development of psychology of a totally different character. It is concerned with the field of conation and emotion rather than with the intellect.

"When we have tested and measured and weighed the child, and have read into him the psychology that has been accumulated as a result of the introspective study of the adult intelligence, we feel that we are at a loss to understand many of the things that he does."[1]

Recently much new light has been thrown on the emotional and conative elements of mental life, both in the case of children and of adults, by the investigations of Professor Freud, of Vienna, and of his pupil, Dr. Jung, of Zurich. We may say at the outset that Dr. Jung has somewhat modified the doctrines of his teacher. The substance of his teaching is sometimes referred to as *analytical psychology*; that of Freud's is usually known as *psycho-analysis*. The latter seems to be the better term to use in both cases, since we have already assigned a meaning to the expression *analytic psychology*,[2] which is very different from that now proposed for the *analytical psychology* of Jung. Let us therefore adopt *psycho-analysis* as the term to be used, whether we are speaking of the work of Freud or of its modifications by Jung.[3]

The new discoveries seem to have begun in the study of *dreams*. In the past, psychologists have largely neglected these phenomena. They have considered them as disordered products of a brain which in normal sleep should be quiescent, but which is sometimes partially active, giving rise to more or less absurd combinations of imagery determined by relics of the immediate past and sometimes in some degree by actual sensations of the present, the whole being without the control which full consciousness exerts.

[1] G. H. Green, *Pyschanalysis in the Classroom*, p. 30. [2] See p. 13.
[3] Sometimes Psycho analysis is spoken of as the "New" Psychology.

A laboured digestion during sleep was often supposed to be the chief cause, while any other unpleasant circumstances were often given an important place. Thus a person already dreaming might have his feet uncovered and getting very cold; under these circumstances, his dream would conceivably take the form of walking on ice or stepping into cold water. These explanations may still have their place. But, according to Freud, they are by no means all.

Many of the ancients believed that dreams could be shown to predict the future. Even in these days, there are some who share this view, and others who are willing to profit by this credulity in endeavouring for remuneration to explain the dreams of those who come to them.

Such notions are far removed from Freud's theory. He believes that in many cases dreams explain much in the past and the present which cannot be known by ordinary methods of inquiry. The dream for him is the expression of an *unconscious wish*.

To the psychologist of ordinary consciousness, such an expression seems absurd. At first sight, it appears self-contradictory. How can one wish for anything without being conscious? But let us reflect a little. There are many cases in conscious life in which people do things influenced by motives of which they are not aware, and even assigning other motives which they themselves believe in.

The realm of our conations, of our instincts and emotions, is largely unknown to our clear consciousness. We feel vague stirrings, but we scarcely know what they are. It is only when we read about them, or hear of them from others, that we get any definite notion of their strength and importance.

This conative urging is referred to by Freud and Jung as the *unconscious mind*, and its activities, especially when it is checked or thwarted, are supposed to play a very important, though more or less hidden, part in the field of our conscious experience. It is conceived of by another writer, Lay,[1] as an unknown Titan within us,

[1] See *Man's Unconscious Conflict.*

who is more or less determined to pursue his way unmolested. Another term often used to mean practically the same thing is *libido*, though this is used to designate rather the force of the striving than the whole. Freud considers that the sexual instinct plays the great part in it. He believes that the force of nearly all our striving is derived from the urge towards sexual possession, intercourse and dominance.[1] It is here that Jung differs from him, assigning a much inferior influence to the instinct in question.

Now the reader has probably already been somewhat shocked at Freud's theory. But this illustrates the very case in point. Our conscious lives keep us in contact with a world of civilisation to which the coarse, powerful Titan is a repugnant being. And unless he can get satisfaction in the course of ordinary experience, he chafes and strains and often makes his uneasiness felt—*in dreams*.

To normal consciousness his raw desires are shocking. And even in the comparatively unregulated realm of the dream, there is a sufficient amount of ordinary consciousness, with the ambitions and aspirations connected therewith, to constitute some sort of check. This restraining influence is personified by writers on psycho-analysis as the *Censor*. And the effect is that even in the dream the coarseness of the Titan must often be disguised.

Take the following case given by Mr. Green in his interesting book on this subject.[2] It is the dream of a boy of nine.

"I was in Rome, where I met the Emperor Augustus. He was pleased with me, and made me second to himself. I fought for him and lent him large sums of money. But he was ungrateful, so I fought against him and beat him.

[1] "The word 'sexual' is used in its widest sense, as you are so often told nowadays. It does not mean merely sensual feeling, but all feeling of attraction, of affection, the sort of feeling that may not only arise between persons of different sexes, but may subsist between persons of the same sex in the form of friendship, between parent and child, between master and pupil—in fact, in Freud's modern theory it covers the whole field of emotional attraction, of emotional relationship." (Brown, *Talks on Psychotherapy*, p. 59.)

[2] *Psychanalysis in the Classroom*, p. 214.

I took the princess from him and married her, and made myself the first man in the kingdom."

No explanation is given of this dream beyond the fact that further investigation revealed that the dreamer had identified his father with the Emperor Augustus, and that the dream occurred at a time when the boy was reading adventure, classical history and fairy tales. But it seems fairly clear that the boy's unconscious self or Titan had been wounded—possibly by the large share of attention given by the father to other members of the family. It may have been that the mother was the chief recipient of this attention, and that the boy, being exceedingly fond of his mother, was moved to a jealousy of which he was not aware in his ordinary waking consciousness. The Titan, by clothing his checked aspirations in the images at hand from recent reading, is able to pass the Censor (*i.e.* the sense of fitness which even in dreams has some power of control), and to assert his unsatisfied cravings.

With regard to the jealousy referred to, it should be pointed out that, according to Freud, every normal child has an unconscious complex or psychical attitude of emotion and craving for each of its parents. That which centres on the father is called the *father-complex* or *father-imago*; that which concerns the mother is called the *mother-complex* or *mother-imago*. In many cases, the *mother-complex* is by far the stronger with boys and the *father-complex* with girls. And in each case there is often reciprocity, *i.e.* the parent in question is also drawn particularly to the child. This attraction is also, according to these authorities, quasi-sexual in character, all unbeknown to the persons concerned. It has the danger, especially with boys, that the parent, in overwhelming the child with tenderness and care, permanently undermines his or her capacity for independence.

We all hear of "mother's darlings" or "mother's boys"; and, later in life, we hear of husbands who refer to their wives with the expression "Mother," even though they may have no children. It is thought, indeed, that often men are attracted to the women whom they marry by reason of similarities which these women possess to the

mothers of the men, but of which the men themselves are not definitely conscious. The Titan is acting without the knowledge of its slave.

At this point, one may well ask: What is the harm in these dreams? There may be little harm in the dreams themselves. But there may be a great deal in the mental state which they indicate. The dreams, indeed, may be welcomed, if they lead the skilful analyst to detect the evil which is responsible for their appearance. As we have noted, they are due to repressed cravings; and if this condition is allowed to continue, it may, if it has not already done so, lead to a divided state of the total personality which renders the individual neurotic and ineffective in life. The Titan is pulling one way and the forces of civilisation are pulling in another. The individual, all unconscious of this struggle, sinks slowly into a state of illness in which his nervous system is, of course, affected, but in which all kinds of other symptoms may occur. Such a state is called a *neurosis*. It is said of one man, who came to hate his wife intensely, but who in his conscious life was too much influenced by the desire for appearing respectable to think of divorce or separation, that he actually became blind! This was the only way the Titan could find after a long struggle of banishing from sight the hateful creature!

Let us take a milder case.[1] "A little girl of nine had grave difficulties in acquiring the French language,[2] and seemed quite incapable of remembering any rule for the formation of the plural. It must here be mentioned that she had a little brother about four years younger than herself. Until his arrival, she had enjoyed the entire attention of her parents, and perhaps rather more than usual, having been a delicate child. This little brother had been a quiet amusing child, his sister's double and staunch ally, doing all she wished, following her lead in every possible way, But during that summer his attitude

[1] Quoted from "The Value of Psycho-Analysis to Education," by Mary Chadwick, *The New Era*, July 1923, pp. 200-1.

[2] By many modern authorities this age would be considered too early for beginning the study of a foreign language.

changed; a greater independence asserted itself, and instead of being his sister's shadow, he established himself her rival for the admiration, applause and love of relations and friends. What is still more interesting, at the time when the French difficulty was at its height, he manifested this rivalry openly, by asking guests assembled for a luncheon party, whether they would prefer wine from a bottle marked with his or his sister's name, when he was playing with a toy railway-station refreshment trolley. All this time, the little girl was sleeping badly and her emotional state was seriously disturbed. Presently she volunteered information about her dreams, which was all too significant. She frequently dreamt that all her friends and relations were dead and she alone left alive. Here the psycho-analyst learned the secret of the impossibility to form a French plural. The child *wanted no plural*, other people were distasteful to her—dead—which to the child-mind means gone away[1]—only she herself was to be left, *the singular and first person at that.*"

Having diagnosed the evil, one naturally desires to know the remedy. The first point to notice is that the emotional craving of the Titan is unsuspected by consciousness and attempts to evade discovery by disguise, attaching itself to other objects. In the last case, it manifested itself in conscious life—*the subject being however unconscious of it*—by attaching itself to French, especially to the plural forms of words. It requires, therefore, to be brought to the surface, as it were, *i.e.* the subject must be made fully conscious of it. There is then no longer a hidden conflict, the lower impulses are brought into the full light of day and made to confront the higher aspirations of the individual. The craving is relegated to its proper place, often being employed in driving useful mental machinery, the emotion is worked off, unity is restored, and the patient becomes a sound, efficient human being. This working-off of useless emotional complexes and setting free of conative energy for worthy objects is sometimes called by psycho-analysts *abreaction*.

[1] For this reason the "Censor" could pass the dream with all its lack of disguise.

A very illuminating case is given by Green.[1] A woman had a morbid horror of cats. She narrated the following dream: "I was standing with something in my hand, which I was holding very tightly. I looked down and to my horror saw that I was holding a kitten, which I had squeezed to death. I was very distressed, because, although I detest cats, I would not willingly hurt one for anything."

Just before the dream, this lady, who held a certificate from an examining body which we will call X, had been beaten in her applications for several higher posts by rivals certificated by another examining body, which we will call Y. Suspecting with reason that her qualification from X was not fairly estimated, she wrote to the secretary of X, suggesting that steps should be taken to see that holders of certificates from X were fairly treated.

She submitted herself to questions with regard to her dream. With respect to cats she stated that they suggested deceit. Deceit recalled to her mind a girl who read a book when sent to dust a room. The girl she admitted was herself. The person who sent her was her elder sister. At that time her elder sister dominated her and showed favouritism for a younger sister. She was jealous, miserable, and often wept about it.

She was now asked the name of her younger sister.

"Katherine," she replied.

"Used you to call her Katherine?"

"Oh no, never," she said. "We used always to call her Kitty. . . . *But I never wanted to kill my sister.*"

Without any suggestion from the psycho-analyst who is questioning her, she suddenly realises that the cat which she hates represents the sister of whom she used to be jealous. The Titan within her having had its fierce vindictiveness repressed by the nobler sentiments of the young girl's full consciousness has transferred his hatred to the cat, which at any rate bears the same name (Kitty). For long years that hatred has persisted, though repressed

[1] *Op. cit.*, pp. 157-161.

as such from consciousness, its only effect being an unexplained horror of cats.

She has come now to love her younger sister. But the Titan below still rages. And it is only when the circumstance of having once again a rival (for an appointment in this case) suggests or brings about a dream in which the Titan can play a part in disguise (squeezing the kitten to death) that the opportunity occurs of unearthing him and bringing him under the high-power lens of full consciousness.

The Titan is now discovered and brought into forced unity with the whole of her consciousness. In so far as she accepts responsibility for the Titan as being in a sense herself, she is forced to confess—

(*a*) I want to kill my sister.

But her changed attitude towards her sister dictates—

(*b*) I do not want to kill my sister.

(*a*) and (*b*), direct opposites, confront each other in clear consciousness. (*a*) is destroyed by (*b*), which is felt to be both true and right. The pent-up jealousy of the old Titan is released and dissipated. *And the horror of cats has completely gone.*

It will be noted in the last case that the psycho-analyst led the subject on to wander in apparently aimless fashion from one idea to another called up casually by association. This method of attempting to discover the undercurrents of a person's mind is termed the method of *free associations.* In more systematic procedure, the dream is carefully broken up into its parts, and the dreamer is invited to concentrate attention on each part, allowing his mind to wander freely, and stating to the psycho-analyst all the thoughts that come. In this way there is every chance of lighting upon intimate thoughts which indicate the nature of the difficulty of which the actual dream is only a disguised form. In this connection, it may be stated that the actual dream is often called the *manifest dream*; the real situation of which the dream is a symbolic representation is called the *latent dream.* The work of dream analysis thus consists in reversing, as it were, the process whereby the dream has been constructed.

It may be objected that some people have few, if any, dreams, and that some dreams are apparently meaningless. These facts are not disputed. But it must be remembered that we are dealing with abnormal cases. Further, although many dreams appear meaningless, there is often something of the suppressed wish in them, if it could only be discovered. Take for example the following recent dream of the writer, who dreams very seldom.

I dreamt that I woke up in the train at Derby, on the way to Matlock, just after the other people had got out to change trains. My wife, who was apparently accompanying me, had got out with the others. I got out myself and hurried after her. I was told by a porter that the desired train was on the fifth floor. But at this moment I discovered that I had left my umbrella in the carriage of the old train. I returned and found it hanging from the parcel-rack. I started back only to find that the desired train had gone. When I woke up, probably soon after the dream, it was just past five o'clock.

This seems a confused medley of absurdity. The elements, of course, are drawn from past experience. I *have* made the railway journey in question, though it was many years ago. I have also frequently on long journeys hung my umbrella from the parcel-rack. I have had to go back for it on at least one occasion. And I once lost an umbrella in the hurry of getting out from a train. But can any *suppressed wish* be traced in this dream?

Perhaps a little further information will reveal something of the kind. I went to bed the previous night very late. But I desired to rise early—probably about 5 o'clock. We are told that there are some people who can decide on the time of their waking, fall into a dreamless sleep, and wake at the prescribed time without fail. It is as though they can hand over the responsibility to the unconscious mind, or at any rate to a deeply sub-conscious section of their being, and rely on count being kept of the time. This, however, is not by any means an easy thing with me. I remember that on one occasion, when it was imperative to wake early, and I had taken no precautions

to be awakened by other means, I remained in a state of semi-wakefulness the whole night. On another occasion, when I went to bed very late, to have a few hours of sleep before starting out early on a journey, I overslept and had to be definitely aroused long after the arranged time. But in the present instance, it appears that the Titan, or some similar being, was on the watch and disturbed my slumber by the dream in question. Further, on the previous day, I had gone to a building to attend a meeting which I expected would take place on the ground floor, and had been directed upstairs to the first floor. This circumstance was evidently incorporated into my dream with the change of floor to the *fifth*—probably in harmony with 5 o'clock, the time of waking. I can give no explanation of the leaving of the umbrella or the loss of the train, except that these symbolised what I should lose by failing to awake and go about my business.

The really significant dreams, however, with which we are are principally concerned, often point back over long tracts of life, sometimes to early infancy, and their interpretation may reveal repressions of which the individual is absolutely oblivious.

There are other means of discovering these repressions and the unconscious conflicts to which they give rise besides the analysis of dreams. These may be used as supplementary to dream-analysis or independently. We can only briefly indicate them here.

The first is by subjecting the patient to a series of tests in reaction times in connection with ideas called up by association. The subject is given words one at a time and is asked to react as quickly as possible to each by stating the first word that occurs to him, regardless of the consideration as to whether it appears stupid or irrelevant. The word given is called the *stimulus* and the first word that is thought of is called the *reaction*. A long list of words (usually about 100) is prepared and among them are introduced a few specially significant words, *i.e.* words connected with the suspected difficulty. It is useless, of course, to attempt this test, if the analyst has no idea as to the nature of the repression. The following table gives

a few results obtained from two subjects (A and B) in an artificial trial of this test.

A.'s Performance.		Stimulus in each Case.	B.'s Performance.	
Time in Seconds.	Reaction.		Reaction.	Time in Seconds.
2·0	by	road	road-mender	3·2
1·2	and	cup	saucer	2·3
2·0	setting star	rising sun	field	4·6
3·4	paper	letter	surprise	2·5
1·6	shore	sea	ship	3·2
2·0	road	hedge	tree	3·2
5·2	woman	large shawl	old lady	3·0
1·0	Cambridge	London	wet road	2·8

The significant words in this test are *letter* and *large shawl*, and A was the only one of the two for whom they could be significant. (This subject had previously been asked to read what appeared to be a serious communication with regard to an important secret affair, and the words in question were prominent features in that manuscript.) Neglecting these two words, we shall find that the average time for reaction of A is 1.6 seconds, while that of B is just double—3.2 seconds. It is well known that different people take, on the average, different times to react in this way. But what is most worthy of attention is that, in the case of the two significant words, while B reacts in times which agree with the average for the non-significant words (In point of fact, the times are a little under the average), A takes much longer. Often, too, the subject, though in most cases quite innocent of the object in view, will show by manner, and even remark, that there is some exceptional difficulty. It may be said in passing that this sort of test has been tried in attempts to detect criminals.

By an association test of this kind, the analyst can frequently discover certain nodal ideas which reveal the character of the patient's difficulty. When once the nature

of the repressed craving has been ascertained, the whole complex can be brought to the surface, the emotion can be worked off, and unity of consciousness restored.

Lastly it is possible, when all else fails, and when the condition of the patient is serious, to use the hypnotic trance. This is a peculiar condition, not unlike the state of sleep, as the word *hypnotic* implies, in which, however, the subject, though profoundly insensible to sense-stimuli generally—more so, indeed, than in ordinary sleep—reacts to stimuli coming from the operator, as by obeying a command, even a somewhat absurd one, or by recalling events or experiences which could not be recalled in a state of ordinary consciousness. If any doubts existed with regard to the reality and efficacy of hypnosis, these must now be considered as entirely removed by the results obtained by doctors with "shell-shock" cases during the great war. In many cases, men were brought in paralysed and unable to speak, as a consequence of their terrible experiences at the front. These men were suffering from a form of neurosis called *hysteria*. Their minds were in a dissociated state much more alarming than the cases we have noted in ordinary life.

And the dissociation in the mind is probably accompanied by dissociation in the brain. "We may assume" writes one of the greatest authorities on this matter,[1] "that some of the synapses[2] have begun to offer more resistance than usual. The nerve fibres may have shrunk or the gap may be greater than before, or some other change may have taken place in the nervous tissue. Now we find that cases of this kind are easy to hypnotise, and they are most quickly cured by light hypnosis." Hypnosis we may add, is itself a form of dissociation; and where the latter already exists, it appears to be easy to produce that special form of it known as the hypnotic trance.

We may well go on to give Dr. Brown's account of the treatment. "One asked the patient," he writes, "to lie down on the stretcher, relax his muscles, close his eyes,

[1] Dr. William Brown, *Talks on Psychotherapy* (Univ. of London Press). See especially pp. 21—34. [2] See p. 22.

and think of sleep—calmly and without effort to let his mind dwell on the idea of sleep. One told him that his eyelids were getting heavier, that after one had counted three he would be unable to open his eyes, and so on. That always worked with shell-shock cases showing dissociation. They were all so easy to hypnotise. One then proceeded to suggest to him that his lost memories would come back, that when one put one's hand on his forehead he would see all that had happened (at the front). If the patient was dumb, he would then begin to shout out. If he was paralysed, he would begin to move again. One encouraged the patient to live through the experiences again with great emotional vividness, with the result that the dissociation disappeared—he became reassociated."[1]

And Dr. Brown adds the following explanation: "One produced this reassociation by producing a further dissociation (that of the hypnotic trance). One made the patient unable to open his eyes, one dissociated this power from the other powers of his mind and nervous system, but incidentally one increased the patient's suggestibility,[2] and through doing so one was able to bring up his lost memories and thus reassociate his mind, and this carried with it other reassociation."[3]

Similar results have been obtained in dealing with serious cases of neurosis brought on by the more ordinary repressions of life. In dealing with some of the obstinate war cases, it was found that some dissociation, due to repressions of earlier life, had already existed before the shock which brought about the final catastrophe. And one of the most curious features of the treatment of these cases was that in the hypnotic trance the patient was often able, under the influence of the analyst, to go back to the earliest years of infancy, and narrate circumstantially events of which he had not the slightest remembrance when in a state of ordinary consciousness. It is as though the Titan, if only his knowledge can be tapped, remembers everything!

It has already been pointed out that Freud's theory, to

[1] *Op. cit.*, p. 28. [2] See p. 268. [3] *Op. cit.*, p. 28.

the effect that the neurosis is always connected with some repression of the sex instinct, is not shared by all. The author's dream, described on a previous page, seems to have no connection with the sex instinct. The dominant wish was to rise early. Now these war experiences, while they show beyond dispute that psycho-analysis is not, as some prejudiced persons have alleged, all nonsense, furnish strong evidence against the supreme dominance of the sex instinct. It seems clear that the forms of nerve trouble in question can be produced by mental conflicts which have nothing to do with sex feelings, even in the widest sense of the word. "A very large proportion of these cases merely suffered from repressed fear. The mental conflict lived through was a clearly defined conflict of fear. These men were intensely afraid. They tried to control their fear; and in that attempt their minds became dissociated; they passed into a dream state, where they did not clearly know what was happening to them."[1]

In further emphasising his disagreement with Freud, Dr. Brown incidentally gives an interesting conception of sleep as being itself an instinct. "The function of a dream," he says, "is to guard sleep. Sleep is an instinct, like pugnacity, flight, curiosity, self-assertion, etc., which has survival value, and has been developed in the course of evolution. At night this instinct of sleep comes into play, but it finds itself in conflict with other instinctive tendencies, as well as with the assaults of external impressions through the senses. Desires, cravings, anxieties, the memories of earlier days, linked up with and sustained by the more elemental strivings of the organism, well up and struggle towards consciousness, while the main personality is in abeyance. If they reach clear consciousness, sleep is at an end, but the dream, which is a sort of intermediary form of consciousness, intervenes and makes the impulses innocuous so that sleep persists."[2]

Much more might be written on this interesting and important subject. But the limits of space prevent us

[1] Brown, *op. cit.*, pp. 29-30.
[2] *Op. cit.*, pp. 35-6.

from going into further detail. It remains to ask what bearing the subject has on the teacher.

The first point to emphasise is that no teacher, having learnt a little of psycho-analysis, should attempt to practise on the pupils. Such work should be undertaken only by the specialist. Here, if anywhere, the maxim, *A little learning is a dangerous thing*, is eminently important.

Many of those who embrace the extreme views of Freud, impressed with the importance assigned to the sex instinct, with the belief that many childish traits are really sexual manifestations, and with the conviction that our silence on sexual matters and discouragement of any inquiries on the subject give rise to repressions which often have lasting results of a harmful character, advocate early sex enlightenment: "Followers of the Freudian school consider that this teaching should be given at the age of from 4 to 6 years."[1]

This proposal alone is sufficient to drive away many who might otherwise be disposed to give Freud a hearing. Jung, however, who has gradually modified his views, is more in harmony with the common sense of the normal citizen. And it is interesting to observe the actual process of modification. "Those . . . who have read his 'Collective Papers' will remember that there is there recorded an interesting paper describing the commencement of a neurosis, and its cure, in a little girl, and that the form of the neurosis was an anxiety condition, due to repression of curiosity concerning sex matters. This paper was written when Jung was still largely under the Freudian influence, and, in fact, he uses the paper at the present time to illustrate his altered view-point. He now considers that the anxiety condition in the little girl was a purely artificial product, and was brought about because the outlook of the parents was at that time very Freudian."[2]

Jung's views are thus more in harmony with current opinion. He "contends" that a child whose natural

[1] Chella Hankin, *The Jung Analysis and Education*, three lectures given before the Theosophical Fraternity in Education, p. 25.

[2] *Op. cit.*, p. 27.

childish instincts are satisfied, and who is surrounded by parents and elders rationally and harmoniously oriented in relation to the sex function, will require practically no sex instruction, for the whole understanding of the subject will gradually unfold itself in a perfectly natural way to its growing intelligence." [1]

At the same time, he agrees that at present we are in many cases very far from these ideal conditions, and that some instruction is often required, especially in boarding schools, which, in his view, are organisations out of harmony with nature.[2] He is opposed, however, to *class* instruction on this subject, at any rate for young children. There should be tactful observation of each individual child, with sympathetic guidance where necessary. The child, according to him, is exquisitely sensitive to the mental attitude of its parents and teachers, and unless these deal with the question in a frank and natural way, it will feel that the subject is taboo, will shrink into itself, so that natural development will be arrested and repressions begun which may lead to much ill in the future. Jung even goes so far as to agree that very young children may be told the usual fantastic tales about their origin. Such tales, he declares, are more natural and satisfying to childish minds than the concrete reality.

Most students of the subject will probably agree with Jung and Brown that we have to deal not with one single craving which dominates the whole personality, but with many; and that these cannot all be connected with the sex instinct without very great stretching of the imagination.

Our Titan, hidden in the bowels of the earth, on closer inspection seems rather to be the many-headed Hydra, each head being able to call on the immense force which reposes in the brute's great body.

[1] *Ibid.*

[2] "Where, owing to unideal surroundings, it becomes necessary to give more explicit instruction to young children, Jung agrees that elementary instruction in botany, and later in biology, can be of great service in helping the child's observation to proceed in the right direction." (*Op. cit.*, p. 29.)

If we realise this, and if we reflect on the numerous possibilities of repression, we, as educators, may well tremble at the complexity of the mechanism which is put under our charge, when a child is brought to us. "What a wonderful thing is man!" we are told. What a still more wonderful thing is a child! For, whereas in the man much has become fixed and stereotyped, in the child there is opportunity for boundless modification—for evil or for good.

The force of this Hydra can be brought to co-operate with others for the welfare of society or it can be wasted. It can be wasted in comparatively harmless dissipation or in hurtful chafing against restraint.

The latter of these alternatives has already been discussed in dealing with the psychotherapeutic procedure adopted in curing cases of neurosis. The cause, as revealed by the analysis of dreams, by free associations, by the specially arranged association tests of reaction times, and sometimes by hypnosis, has been found to be the repression of strong deep-seated cravings and emotions which have bidden themselves away, not daring to show themselves in the light of ordinary consciousness, and have produced a definite break or dissociation in the personality. The *Strange Case of Dr. Jekyll and Mr. Hyde* has been repeated, though fortunately in many cases the final catastrophe has been prevented by discovery of the duality and reunion of the personality.

But in many cases the *libido* is not completely repressed. It does not hide itself completely away, chafing and raging at overwhelming restraint. It persists, at any rate near the surface of consciousness. And it consumes a large part of the available energy of consciousness. *Day-dreams, novel-reading, the "Pictures," the watching of football matches*, these and other similar occupations dissipate a large fund of energy which might otherwise be employed, and happily employed, in some form of useful service. All such means of recreation, when carried to excess, and when lacking any serious purpose, provide the individual (who is usually a failure in real life) with means of identifying himself in imagination with glorious success

and thus of occupying and satisfying with spurious achievement that *libido* which should be a driving force in the actual affairs of life. "The amount of time in a year that is not used up in mental operations designed to attain a definite purpose other than mere killing of time, is admittedly very great for almost all persons. When it is reflected that all this time is spent in actively or passively carrying on undirected thinking, which is popularly called reverie or day-dreaming, and in psycho-analysis is called phantasying, it will be realised how very large a portion of the time of every one of us is spent in laying the foundation of future miseries. There is scarcely a more pitiful sight than old age slipping into imbecility because of not having a body of organised directed thoughts to fall back on, and there is nothing more inspiring than the intellectually green old age of some of the world's great thinkers and performers."[1]

It must not be thought that all indulgence in such recreations as those specified is to be condemned. Nobody can keep on the highest level of endeavour continuously, and it is permissible to descend for a time to lower planes and to idle awhile, if only it is understood that one is merely taking a short rest. Further, there are sporadic impulses, excited by the circumstances of the moment, which can often be worked off in a comparatively harmless way by some form of imagination in which the individual whose craving is repressed identifies himself with a being of fiction and gains a momentary satisfaction which is denied to him in reality. Indulgence of such a kind, if it ends at this point, often acts as a cathartic for the evil impulses and emotions. The accompanying sketches from *The Star* are an amusing illustration of such a case (see Fig. 24, page 414).

But if such indulgence, whether in the form of day-dreaming or of any other futile expenditure of time, becomes a habit—*the* habit of life—it is harmful and destructive. Left to itself, the *libido* regresses to the lowest levels, renouncing all effort to rise to better things.

[1] Lay, *Man's Unconscious Conflict*, p. 182.

Lay refers to this truth as the *psychic law of gravitation.* "The psychic law of gravitation," he says, "is the ever-

Fig. 24.

present tendency on the part of the psyche to seek the lowest level of its development rather than to progress in

an upward direction as viewed from the standpoint of social organisation."[1]

The problem of the educator, therefore, is that "of guiding the libido from undesirable to desirable channels, *without running any risk of repression.*"[2] The unconscious craving may be compared to a river which has to the dammed (the damming representing the influence of society by education). Careless and ignorant damming may produce effects which are harmful or, at best, futile. If the water is completely held up for a period, the strain will increase until a break is made in the dam and catastrophe ensues. If the water is merely diverted, it may flow on in other directions, doing no work, and consequently defeating the purpose of the operation. But with scientific damming, the greater part of the force of the river may be utilised to run mills and generally to minister to the well-being of mankind.

So it is with education. If authority controls the child too harshly, compelling conformity to a multitude of arbitrary rules, and forcing application to subjects in which no interest has been aroused, "we crush in the bud what later we most desire to develop—namely an independence of thought and a self-conscious adaptation to the needs of society."[3]

All this points to the need of individualistic methods in education.[4] It is not sufficient to have studied child-psychology in general. It is not sufficient to have studied some individual children, and to be aware that there are differences in all cases. One must know as much as possible *of the individual child.* Even to know his name is a beginning. It gives some increased power over him. To know something of his family and circumstances is still more useful. It is useful as a guide in the adaptation of one's treatment to him, and it is also a direct aid to discipline. The more the child feels that he and his circumstances are known by the teacher, the more he realises

[1] *Op. cit.*, p. 246.
[2] *The Jung Analysis and Education*, p. 31.
[3] Lay, *Op. cit.*, p. 298.
[4] See p. 12.

that he is *in the teacher's hands.* "A very different attitude to the teacher has been observed after the teacher has asked the pupil who his father is, and what is his business, how many brothers and sisters he has, etc., or any number of personal details, without the slightest reference to the form of disorder which may have caused the teacher's attention to be specially directed towards this pupil."[1]

The deeper knowledge of the pupil which psychoanalysis would give is at present denied the teacher in most cases. But in some difficult cases, it would doubtless be of great help. "It often happens," writes Pfister, "that an aversion to a certain subject or to several of them can be removed by analysis. One boy was not able to learn mathematics and languages because his father kept insisting that he should study them, but in natural science and manual training, which in his case were associated with his mother, he did excellent work. In uncovering the father-complex, psychanalysis enlisted the excellent abilities of the boy in the interest of the formerly hated subjects."[2]

Although, under present conditions of training for the office of teacher, sufficient knowledge and skill in psychoanalysis is not possible to warrant analysis being untaken in school, the teacher who adopts individual methods has the consolation that by these means he gets to know more of the tastes and inclinations of each member of the class than he could do under the system of mass-instruction. Further—and this is perhaps still more important—the pupils, having more choice, are less in danger of being coerced.

It is obvious, then, that such methods as that of Madame Montessori for infants, and the Dalton Plan for older pupils are less likely to cause repressions than the older methods.

At the same time, it must be borne in mind that complete freedom is impossible. We wish the child to accept

[1] Lay, *Op. cit.*, p. 282.
[2] Quoted by Lay, *Op. cit.*, 278-9.

cheerfully the necessary restrictions of civilised life, and to take as much responsibility as he can manage. By all means, let us govern without harshness, suggest rather than command, and lead rather than drive. Let us, above all, try to find out those things which are useful and which the child can and will do without compulsion. But let us remember that if the stream is to be of service in doing useful work, its waters must be to some extent controlled. In some cases, the youthful psyche, try as we will, does not respond to our suggestions. In such cases, if the child is left entirely free, "psychical gravitation" will keep it permanently on a low level, not only of knowledge and skill, but—what is still more to be deplored—of morality. Some amount of compulsion will at times be necessary.[1] If it is wisely applied, in full sympathy with, and understanding of, the child's inner nature, there is every prospect that it will be successful in achieving its object without harmful consequences.

One ought not to conclude this matter without a few words on the influence of religion. The religious sentiment, with the aspirations connected with it, constitutes a force which may transform and uplift the whole personality. Where religion is thoroughly real, permeating the life in all its aspects—perhaps a very rare thing to find—it stamps a hierarchy on all other desires. These, being under control, are no longer liable to become excessive and to suffer repression. "A repression is a product of a repressed unregenerate will, and not of one which is constantly directed to some high purpose."[2] This book is not the place in which to preach any form of religious belief. But it would be very imperfect if it did not include definite recognition of "the dynamic force accompanying a continuous orientation towards high spiritual ideals."[3]

[1] See quotation from Mrs. Mumford on pp. 245-6.
[2] *The Jung Analysis and Education*, p. 31.
[3] *Ibid.*

QUESTIONS ON CHAPTER XVII.

1. State and explain as fully as you can what is meant by *Weber's Law*.

2. What is the difference between *general* and *special intelligence*? At what age would you expect each to come to maturity? Give reasons for your answer.

3. What do you understand by *group tests*, and for what sort of inquiry are they suitable?

4. What is the utility of *individual* tests of general intelligence?

5. To what use can such tests as those in Mechanical Arithmetic and in Arithmetical Reasoning, framed by Dr. Ballard, be put?

6. What do you understand by the *curve of normal distribution*? Of what help is it to the teacher who is reviewing the results of an examination in arithmetic?

7. What is meant by the term *correlation* as used in connection with the results obtained by mental tests.

8. Explain as clearly as you can Freud's theory of the dream. What is the *Censor*?

9. Describe *dream analysis*, explaining what is meant by the terms *latent dream* and *manifest dream*.

10. Point out the chief difference between Jung's latest views and those of Freud.

11. Explain the terms *father-imago* and *mother-imago*. What dangers are connected with these complexes?

12. What is a *neurosis*? Describe briefly the psycho-analytic methods by which it can be cured.

13. Sketch briefly the process whereby tests in word associations are used in psycho-analysis.

14. What is the *hypnotic trance*, and how has it been used in the service of psycho-analysis?

15. Give Dr. Brown's theory of sleep and dreams, pointing out any important difference from Freud's views.

16. What is the *libido*, and what part does it play in life?

17. State clearly the evils of excessive day-dreaming, novel-reading, and similar pursuits, indicating at the same time an excuse for moderate indulgence.

18. Show how the teacher is helped in his work by a thorough knowledge of the individual pupil.

19. To what extent are such methods as that of Madame Montessori and the Dalton Plan in harmony with the findings of psycho-analysis?

CHAPTER XVIII.

FURTHER DEVELOPMENTS.

IN the previous chapter, under the title of the "new" psychology, we briefly sketched two important developments—mental tests and psycho-analysis. With the passage of the years, two further developments of psychology have attracted attention, and have made sufficient stir to warrant some consideration of them in this place. They are *Behaviourism* and the *Gestalt Psychology.*

So great are the differences now subsisting among psychologists of different schools that Dr. Ballard in a recent article affects a discouraging pessimism with regard to the whole subject. "The trouble is . . . ," he says, "that the votaries of the general science of psychology have split up into warring schools or sects. Each maintains that it is the custodian of the true faith, while all the other sects have gone astray like lost sheep. The behaviourists will have no traffic with the introspectionists, the 'Gestalt' psychologists none with the psycho-analysts."[1]

Now the psychology expounded in this book is based on introspection.[2] And it is difficult to imagine how the science could have ever begun without some amount of looking within. But this does not mean that we must confine our inquiries to introspection. We have already made a study of the nervous system. We have noted the importance of observing children in their conduct and

[1] "Psychology and the Teacher," in *The Times Educational Supplement*, Nov. 20, 1937.

[2] See pp. 35 ff.

development. And in dealing with psycho-analysis we have admitted that introspection will not suffice to discover all the motives and ideas by which an individual is swayed.

Some rabid extremists among psycho-analysts have been so impressed by the discovery of motives and complexes hidden from introspection that they have poured unrestrained contempt on the latter process. They appear to ignore the fact that none of us would know anything of any motives or complexes had we not experienced some of these at first hand in our own minds. Introspection is an essential starting point for psycho-analysis.

Behaviourism is still more drastic than psycho-analysis in contempt of introspection, though not for the same reason. Pressed closely, the psycho-analyst has to admit the need of some introspection. He interrogates his patients with respect to their dreams, their associations, their customary thoughts and feelings. He hopes in this way to obtain hints leading to the discovery of complexes hidden in the depths of the "sub-conscious," and therefore not accessible to introspection. Many psycho-analysts, indeed, admit that there is no impassable gulf between the conscious mind and the subconscious. And a few will agree that introspection may by intelligent probing gain some knowledge of hidden complexes. But behaviourists will have nothing whatever to do with the results of introspection.

The behaviourists cannot, of course, deny that there is such a process as introspection. They will, probably, also agree that every mental process involves not only some knowledge of an object—whatever that object may be—but some awareness of oneself as the subject knowing. Now in a definite effort of introspection, the subject takes as his object his own mental states. And the behaviourists maintain that the very act of switching attention upon these states changes their character. When I am very angry with a person who has insulted me, there is no time to examine the state of my mind. If, being something of an introspective psychologist, I make the attempt to look within, I have completely changed the angry state; I am

now in a state of scientific inquiry. Professor Spearman quotes from the introspections of Carveth Read during some painful surgical operations to the effect that "when the pain is very intense, it occupies the whole mind." And when, being somewhat less intense, it left some energy to the mind for introspection, Read found that his pain was diminished by studying it.[1]

The behaviourists point out, further, that each of us can be aware only of his own mental processes, and is unable to compare them with those of others. When A and B look at the sunset, they may each agree that a sensation of redness is experienced, and name it as such; but they cannot compare their sensations, and these may be widely different. Some colour-blind persons have gone on for many years without being aware of their defects. "Your friend may report 'red' where you say 'red.' Still you do not know more than that your friend always has the *same* quality wherever and whenever you have your 'red,' without knowing at all that he has *just that* quality which you call 'red.'"[2]

The behaviourists maintain that a *science* can be based only on observations which can be corroborated by additional observers. And, as what takes place in each of our minds must of necessity remain private, they rule out all introspection, even so far as they admit that some awareness of our states is possible. They fall back therefore upon what can be observed by all—on our *behaviour* in response to various stimuli, and on the results produced by that behaviour.

Behaviourism makes much of the doctrine of Association. But it concerns itself only with stimuli on the one hand and resulting movements on the other. It takes no account of any *meaning* we may acquire by the association of different sensations. It concerns itself in this field only with the neural basis of association. Of Watson's well-known book,

[1] Spearman, *The Abilities of Man*, pp. 104 and 106.
[2] Köhler, *Gestalt Psychology*, p. 9.

Psychology, from the standpoint of a behaviourist, Mr. Charles Fox remarks: "This is an excellent book on *Physiology*. Provided that he does not think he is reading Psychology the student will learn much from it concerning the physical basis of mind."[1] And in another place he says: "Suppose a behaviourist confronted first by a bear in a modern zoological garden and then by a bear at large; to the former he offers a bun, to the latter a clean pair of heels. Will he now undertake to explain in terms of behaviour alone his very different responses in the two cases? Only by the knowledge that the free and the confined bear *mean* totally different things can the vastly different adjustments be explained, not *vice versa*."[2]

But Behaviourism, in its negation of all consideration of consciousness, leads us on to far more serious consequences. "Romantic love, marital fidelity, and pre-marital chastity for either sex, all these become absurd and pernicious survivals. Watson has foretold that within fifty years marriage will have ceased to be an American institution; and there can be little doubt that if this theory of human nature be true or if, in spite of its falsity, it should continue to spread as it has spread in the last decade, his forecast will be realised."[3] We must bid adieu to all that makes man noble, and consider ourselves as mere machines responding to the stimuli which our environment provides. "Finally, the teaching that the feelings and emotions are utterly negligible cannot fail to have a brutalising effect. It is notorious that in some of the European countries such teaching in regard to animals has made the people utterly callous to the sufferings of animals."[4] Behaviourism, accepted in its entirety, is like *Hamlet* with the central figure left out.

Behaviourism is thus only ancillary to psychology. While it may help us to understand the conditions of some

[1] Fox, *Educational Psychology*, p. 416. [2] *Op. cit.*, p. 126.
[3] W. McDougall in *Behaviourism, a symposium* (Student Christian Movement Press), p. 52.
[4] *Op. cit.*, p. 53.

of our mental states, and even to infer something of their nature, its findings are of value to psychology only when viewed in the light of introspection or of inferences drawn from introspection. We must admit the defects and limitations of introspection which have been emphasised in the criticisms by behaviourists. The direct observation we get of our mental states may be no better than the view we obtain of a landscape when we are rushing along at full speed in a train through a tunnel which has occasional short gaps opening on the surrounding scenery. Yet by some awareness of a mental process during its occurrence, followed by "perseveration,"[1] and later by more or less dim memories, and with the aid of inferences from our behaviour, we piece together some account of the psychosis, and this is the only purely psychological information we can get.

We may even carry the war into the enemy's camp, and point out that when two physicists are observing the same galvanometer, they are not, strictly speaking, observing the same thing. "If another man observes the galvanometer, he observes something other than the galvanometer as a physical object, since the object of his observation is the result of certain organic processes, determined by the physical galvanometer. Again, the galvanometer I am observing is the final result of a different series of processes occurring in *my* physical organism."[2] We all know that where extreme accuracy is required in observation of physical apparatus, allowance has to be made for "personal equations." And the procedure works. No reasonable person questions the accuracy of the results.

Similarly, though to a far inferior degree, in psychology. We cannot claim anything like the same approximation to accuracy as in the physical sciences. Our introspection must always be far more uncertain and patchy than any observations in physics. It cannot be directly corroborated by others. We have no means of direct measurement of

[1] See p. 206. [2] Köhler, *op. cit.*, p. 21.

mental phenomena. All our so-called "mental measurements" are indirect ones, being measurements of behaviour rather than of mental processes. Yet, unless we admit the validity of introspection, and of the inferences whereby we compensate for its many shortcomings, we must give up psychology as a serious pursuit. For psychology is the study of *mental* processes.

In this connection, it should be pointed out that all the so-called "mental tests" described in the last chapter are, strictly speaking, measurements of behaviour. "Instead of endeavouring to examine the minds of his 'subjects' by interpretative exploration enlightened by introspection, the 'new' psychologist stands outside and applies more of less ingenious tests. The results obtained are often subjected to mathematical treatment, from which various conclusions are deduced as to the capacity of the subjects tested."[1]

Inspired by Professor Spearman, a number of experimenters have carried out a great variety of mental tests, chiefly with the object of exploring the "intelligence" which has so often been referred to and the nature of which it seems so difficult to determine. The results of this work have been summarised by Professor Spearman in three important books—*The Nature of "Intelligence" and the Principles of Cognition* (1923), *The Abilities of Man* (1927), and *Creative Mind* (1930).

In these works, Professor Spearman does not succeed in telling us what the "intelligence" which the mental tests are supposed to measure really is. The second part of the title of the first of the books mentioned is the more appropriate name for his subject matter. In other words, he gives us a survey of cognition, and especially of those mental processes in which definite progress is made, *i.e.* processes involving reasoning and imagination. Indeed, the third of the books mentioned, *Creative Mind*, deals almost exclusively with such processes.

In dealing with cognition, Professor Spearman lays great

[1] Dumville, *Child Mind*, p. 206.

stress on our knowledge of *relations*, and insists that all our creative work, including under this term all solving of problems and much imaginative work, is possible only by the use of such knowledge. In this connection, he enunciates three principles on which, he insists, all such progress depends, and which he calls *noegenetic* principles.

The first of these is the rather obvious one that in every act of cognition we are conscious both of ourselves as subjects and of the objects cognised. The second and third are not so obvious. Professor Spearman, indeed, asserts that psychologists have largely ignored them. The second, which he calls the *Principle of Relations*,

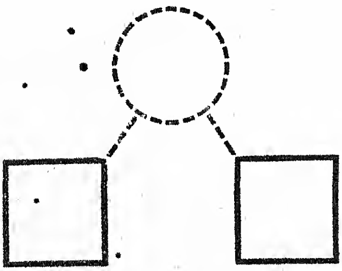

Fig. 25.

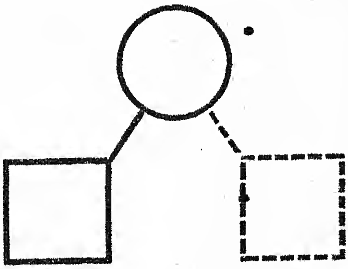

Fig. 26.

states that when two or more objects (perceptual or ideational) are present to consciousness, there tends to arise a knowledge of relations between them. This principle is symbolised in Fig. 25, the dotted part indicating the "creation" of the mind (some relation). The third principle, known as the *Principle of Correlates*, states that when one object is present to consciousness and also some relation, the mind can generate the idea of another object so related to the first (Fig. 26). As a simple illustration of the working of both principles, we may take one of the tests given under the name "analogies"—

Parent is to child as mother is to . . ?

To answer this question the "testee" must first realise the relation between *parent* and *child* (Principle of Relations) and then apply the relation to *mother* in order to give the answer *daughter* (Principle of Correlates). Such processes are known respectively as the *Eduction of Relations* and the *Eduction of Correlates.*

Now things are related to one another in an immense variety of ways. The essence of intelligence seems to consist in using the relation which serves the purpose of the moment. As an example of lack of intelligence we may cite an illustration by Beuler. "It is the case of a mentally deficient cook. She had learned to cook in a family of four. When she moved into a larger establishment she continued to cook four eggs for breakfast, although there were twelve to eat them."[1]

Professor Spearman has worked out a classification of all possible relations, and has given many examples of them.[2] Modern psychology owes him a great debt for his labours in this field. In particular, we have to acknowledge the important rôle played by relations in reasoning and imagination. In our chapter on reasoning, we have referred to them, though not quite so definitely nor quite in the same way as Spearman. Thus we have stated that *reasoning involves essentially the finding of that ideational system which meets the case.*[3] Now, remembering that a system implies relations between its parts, let us take one of Spearman's examples.

"Here is to There as Now is to . . . ?"[4]

"To answer correctly," writes Spearman, "the subjects must first educe the relation of Here to There, and then they must apply this relation to Now, so as to educe the correlate Then."[5] Now "Here and There" form a system consisting of *what is near me* and *what is distant from me* and *a relation between them.* But I cannot conceive this

[1] Victoria Hazlitt, *Ability, a Psychological Study,* p. 47.
[2] *The Abilities of Man,* pp. 168 ff.
[3] P. 167. [4] *The Abilities of Man,* p. 179. [5] *Ibid.*

relation apart from the system. We have, indeed, no name for it. If I wish to refer to it, I must call it *the relation between Here and There*. And when I apply this system to time instead of to space, beginning from *Now*, I am just as entitled to say that I am using the *system* which I have hit upon as the *relation* between the members of the system.

But it should be noted that relations may be *implicit* as well as *explicit*. In the whole choir of heaven and furniture of earth, we have an immense variety of objects connected together by an infinity of relations. No human being can attend *explicitly* to all these relations. We do well to listen for a moment to the *gestalt* psychologists who tell us that, when we perceive an object or group of objects, we grasp it as a figure, or pattern, or *configuration*, standing out from a surrounding background. This account implies the existence of relations, both within the configuration and between the configuration and its background. We *may* go on to note those relations *explicitly*. But we often respond efficiently to a situation with only an implicit awareness of many of the relations involved. The general configuration, more or less vaguely apprehended, is sufficient for the purpose in view. How many men button up their waistcoats in the morning, and unbutton them in the evening, year after year, without knowing the precise number of buttons upon them? The older psychologists used to begin their treatises on cognition by pointing out that it depends on *consciousness of likeness* and *consciousness of difference*. Without these two conditions, no cognition is possible. Now likenesses and differences are *relations*. Yet when the baby recognises his father and crows with delight, we need not posit in his consciousness a knowledge of likeness between this appearance and former ones. And when, in the evening, the light is turned on in the darkening room, we may note his attention to the source of brightness without supposing that he is definitely aware of a relation between the preceding gloom and the stimulating light. Some people, indeed, seem to pass long stretches of their lives without any explicit knowledge of

relations. The very word *relations* is strange to them. As William James tells us, "the relations are numberless, and no existing language is capable of doing justice to all their shades."[1] And again: "We ought to say a feeling of *and*, a feeling of *if*, a feeling of *but*, and a feeling of *by*, quite as readily as we say a feeling of *blue* or a feeling of *cold*. Yet we do not: so invertebrate has our habit become of recognising the existence of the substantive parts alone, that language almost refuses to lend itself to any other use."[2]

It is only in the higher reaches of thought that relations are singled out and definitely used in dealing with a situation or solving a problem. Now Professor Spearman agrees that some amount of the "intelligence" which he is investigating is displayed on the plane of mere perception. And Professor Köhler, one of the exponents of the *gestalt* psychology, gives us instances in which even animals display "intelligence" in dealing with relations implicitly apprehended in a "configuration." He trained hungry apes to drag bananas from without their cages by means of sticks. He then presented to each of them a banana in a drawer with an open side placed furthest away from the animal. Many continued for some time to drag the bananas towards them, only to find them stopped by the near side of the drawer. But in a few cases an intelligent animal had sufficient insight to *push away* the banana and to bring it round in a circular path to the bars of the cage. Now we can scarcely suppose that the animal clearly recognised all the essential relations as an intelligent human being might do. In further support of this view, it may be noted that some of the less intelligent animals were helped by turning the drawer half-way round. And when they had succeeded with this position, they were confronted once again with the more difficult original arrangement. Often they were successful. And when they had once been successful, they dealt with the situation with unerring accuracy in the future.

[1] *Principles of Psychology*, Vol. I., p. 245
[2] *Op. cit.*, pp. 245-6.

Another example from the experiments of Köhler is still more striking. A hen was allowed to take food from the lighter of two gray papers, and was driven away from the darker until it was definitely trained to go with invariable precision to the lighter paper. The darker paper was then replaced by one lighter than the original "lighter" paper. The hen now avoided the paper from which it had become accustomed to take food and almost invariably chose the still lighter one. With another hen, similarly trained, the lighter paper was replaced by one still darker than the other. The hen now chose the paper formerly rejected, which now, of course, was the lighter of the two. It is obvious that the hens were not guided by an association formed between the particular paper originally chosen and the pleasurable experience of feeding. If they had been, they would have gone to this particular paper after the change in the other one. What they noted was that *one paper was lighter than the other*, and that satisfaction was obtained by choosing that one. But did they distinguish the relation *explicitly*? According to the *gestalt* psychologists these hens apprehended the *arrangement* of the papers, or the *configuration*, as these psychologists prefer to call it, sufficiently well to choose the lighter paper, but without definite knowledge of the relation itself.

We may go thus far willingly with the *gestalt* psychologists without allowing them to drag us still further. They cite such experiments as that just described in support of a "mass attack" on the doctrine of *association* and on that theory of still closer connections which Professor Stout has summed up by the name *complication*,[1] by which objects are represented as acquiring more and more *meaning*. They point out, for instance, that when we learn a tune, we do not merely connect together a string of notes: we grasp a *melody*, *i.e.* a pattern or *configuration* of sounds, and they would have us believe that this pattern is the chief means whereby the various members of the configuration are held together. "The configuration theory thus

[1] See p. 62.

swallows up what is true in the association theory," we are told by Mr. Fox;[1] but before we accept such a statement, we must examine the matter more closely.

It is quite true that the constructions we deal with in our minds are largely of the nature of patterns or configurations. And it is also true that many teachers in the past tended to neglect these patterns. They thought of mental constructions as mere collections of separate items, to be connected together by repetition, in order to form strong associations. They did not realise that in many cases the wholes which the children had to construct were already at their disposition, as organised patterns which could be best assimilated, not by taking them to pieces and laboriously connecting the separate elements together, but by making direct acquaintance with them *as wholes*. "Reading was taught from the alphabet, followed by syllables, words, and so on; drawing by the practice of delineating straight lines and simple curves; piano playing by five-finger exercises. Geometry was acquired from Euclid's elements, the definitions and axioms being learnt before the propositions. These elements were supposed to lay a sound foundation for the future superstructure."[2] But modern methods of teaching have improved on these practices. In reading, whole words, and even sentences, are presented to the child at the outset; in drawing, the child is allowed to begin by sketching interesting objects of a simple nature in their complete forms; in music, the beginner may well be introduced to little tunes; in geometry, the child deals with figures in a practical way, "playing" with them, and making interesting patterns with them; and in literature we introduce poems and stories as wholes to our pupils, reserving any detailed study which may be considered necessary for a later period.

But can we safely abolish all the old "grind"? Can the multiplication tables be acquired as patterns? In the

[1] Fox, *Educational Psychology*, p. 22.
[2] Fox, *op. cit.*, p. 23.

old days, these tables were repeated with monotonous persistence by children who had the vaguest notions of what they were saying. And they were applied in multiplication sums, often with correct answers, with scarcely any more understanding of what was being done. Now, however, in modern schools, the children make patterns representing at any rate some of the combinations. They see that $3 \times 4 = 12$ by arranging discs in three groups of four, or by drawing sketches of such an arrangement. But can they deal with the whole of the tables in this way? And, even if they could, would they have the results at their command with sufficient readiness to work sums at great speed and with reliable accuracy? Most practical teachers of experience would reply in the negative. It is good to let the child realise many number configurations. These will help him to understand his calculations and will give him an insight into the composition of numbers which was sadly lacking in many of the older generation. But in the actual work of calculation, he must be *mechanically accurate.* "Seven times eight should not need thinking about, it should bring a response as automatic as the knee reflex."[1]

We have already tried to show that all *habits* depend on associations. The *gestalt* psychologists deny this. "At one time," writes Mr. Fox,[2] "it was the fashion, owing to the prevalence of the association theory, to explain all mental growth in terms of bonds of association between isolated mental data, and the theory of habit which we are challenging is nothing but the doctrine of associationism applied to bodily movements. Instead of starting with a chaos of disconnected movements, sensations, ideas or other "mental atoms," subsequently reduced to order by the magical virtue of association, we believe that a certain arrangement dominates conscious life from the beginning."

[1] W. P. Alexander, address on "Methods of Selection for Post-Primary Education" at the Conference of Educational Associations, University College, London, Jan. 1938.

[2] *Op. cit.*, p. 156.

And he goes on to say: "The function of repetition in habit-formation is, therefore, not to establish paths of low resistance, but to attune the muscular system to the appropriate configuration, just as a violin only yields the best tone after prolonged use by a master-musician." [1]

Now we may agree that it is impossible "to explain all mental growth in terms of bonds of association." We have conceded an important rôle to configurations and to the more definite knowledge of relations which plays so great a part in the higher reaches of thought. We have already referred to these essential factors in learning—perhaps somewhat vaguely—under the title of "thought-links." [2] But we cannot sweep away the whole doctrine of association, as the *gestalt* psychologists would have us do. Reference has been made to the old soldier who dropped his hands to his sides at the word "Attention!" [3] We may profitably quote the statement of the case from Huxley in full.

"As everyone knows, it takes a soldier a long time to learn his drill—for instance, to put himself into the attitude of 'attention' at the instant the word of command is heard. But, after a time, the sound of the word gives rise to the act, whether the soldier be thinking of it, or not. There is a story, which is credible enough, though it may not be true, of a practical joker, who seeing a discharged veteran carrying home his dinner, suddenly called out 'Attention!' whereupon the man instantly brought his hands down, and lost his mutton and potatoes in the gutter. *The drill had been thorough, and its effects had become embodied in the man's nervous structure.*" [4]

To attempt to maintain that the word "Attention" and the movement which followed its utterance are parts of an "appropriate configuration" which has existed from the beginning, seems thoroughly absurd. The connection is a purely artificial one which has been fixed by repetition. If the soldier had been trained to turn his head to the right

[1] *Op. cit.*, p. 158. [2] See page 219. [3] See page 220.

[4] Huxley, *Lessons in Elementary Psychology*, p. 302. Italics ours.

at the word "Attention!", that movement would have followed, at the word of the joker, with the same infallibility.

One more concession, however, may be made to the value of Configuration. In dealing with the learning by heart of a short poem we recommended the repetition of it from beginning to end.[1] And the reason we gave was that when small portions are learned by separate efforts "it becomes very difficult to knit them together in the right order." Mr. Watt tells us that "if 100 lines of verse were learned in this way in twos or fours—say verses from Pope—there would be formed between the lines 198 or 148 associations of which only 100 would ultimately be required. Every second one of these would be blocked by two useless associations, and in order to be safe from their power would have to be raised to a much greater strength than would otherwise have been necessary."[2] We may, however, add a further reason. In addition to the thought-links as such, there is a certain pattern or configuration in the poem which we come to feel more and more as we pass through it repeatedly as a whole. Mr. Watt seems to realise this, though somewhat vaguely, when, in writing of little children, he says: "Just think how well they will remember a fairy story, which they so seldom hear or read in instalments, *and which they will hardly suffer to be broken off*, however often they may have heard them before."[3]

One further example as a warning from the practical teacher to the theoretician. We agree with Mr. Fox when he writes: "A good analogue of mental life is to be found in a living language where the play of meanings is the informing spirit of the whole, whilst sentences, parts of speech, words *et hoc genus omne* are disarticulated parts of the skeleton separated by grammatical anatomists."[4] And also when he adds: "The direct method of teaching

[1] See p. 214.

[2] Watt, *The Economy and Training of Memory*, pp. 50-51. Italics ours.

[3] *Op. cit.*, pp. 51-52. Italics ours.

[4] *Educational Psychology*, p. 127.

modern languages in schools, apart from its infinitely greater effectiveness in practice, is founded on the sound psychological instinct that without life there can be no feeling and that a feeling for language is of the very essence of language."[1] But in another place he writes: "Thus the earliest stages of a modern language should deal with simple actions accompanied by their expression in the new tongue. Later on we may use bits of dialogue from a gramophone record, or better still, from a sound film. We ought to bring an actual experience of a foreign situation to the learner in its living form." If we do what he indicates, *and no more*, we shall have the most atrocious pronunciation, and it will become more or less fixed by repetition. A spoken language is a bundle of habits. At the age of eleven most children have fixed their speech habits for life. If they are to speak another language properly, they must form a new set of habits. It is too late to rely on imitation. When they hear the foreign tongue spoken, they will imitate it by producing the sounds of their own language which are nearest to it, and they will go on fixing more and more firmly what are now bad habits. If, however, they are carefully shown how to produce the new sounds, and required to practise them assiduously, they can begin and go on with absolutely correct speech in the new tongue. This is somewhat slow and "painful" in the early stages. But the children's interest in it can be aroused. Indeed, *all* their interest is required for it—not for "simple actions." Later, the direct method can be followed with profit. But it must be borne in mind that a *purely* direct method requires a baby with a clean linguistic slate. By all means let us follow direct lines; but let us remember that we are dealing with minds which have already formed and fixed a vast number of associations, and that we must take these associations into account, and even make use of them.

[1] *Ibid.*

Reverting now to Professor Spearman's work, we may once again note that he has given us no clear idea as to what "intelligence" is. "In despair of any answer, some have gone so far as to maintain that to talk of intelligence is merely to hypostatise a general name."[1] To hypostatise, in this sense, means to use a name which has no definite meaning, as though it had a real denotation. Thus, if I say that a person can tell fortunes because he has *the power of divination*, I am not stating any new fact by the use of this latter expression: I am merely using words which constrain a dull thinker to suppose that the person in question possesses a definite power. Now is "intelligence," as used by psychologists, a word of this type? The Binet-Simon Tests, in their original and improved forms, have been in constant use for over thirty years. Other tests on similar lines have been devised and used in the same way. And the general agreement is that these tests do succeed in sorting out children and adults according to the amount of "intelligence" they possess. What, then, are we to understand by the term? The most satisfactory answer seems to be that "intelligence" is *the efficiency of the cognitive processes of mind.*

Let us use an analogy from the physical sphere. One man may be able to beat another in many kinds of activity. In running, in sawing wood, in swimming, in gymnastic exercises, and in many other pursuits he may show a distinct superiority over the other. Yet both men may be of approximately the same age, stature, and weight. A careful examination by a doctor may reveal no appreciable difference between the two men. Physiologically, they may appear to be equal. All the organs of each man may be reported as in "perfect" working order. Yet we are forced to conclude by results that one possesses more *strength* than the other. What do we mean by this word? We may sum it up as *physical efficiency*. Although we do not know in what it consists, we are certain of its existence.

[1] Fox, *Educational Psychology*, p. 374.

It may be due to a finer nervous system, which excites the muscles to more powerful movements. It may be due to a stronger heart and a better circulatory system. It may be due to a superior type of blood, which is able to assimilate, carry away, and dispose of the poisons accruing from exertion more rapidly than in the other case. It may be due to many other causes.

Now the science of physiology has done much to explain the workings of the internal organs. And its findings may often assist us in promoting strength. But it cannot give us the reasons why one of two apparently similar men will do better than the other. Psychology is in much the same position with regard to "intelligence." It can tell us a good deal about cognitive processes; but it cannot tell us exactly why these processes go on more efficiently in some minds than in others. It is often forced to content itself with the assertion that people vary in "intelligence."

Professor Spearman has reproached Binet for "mixing things" so much in his tests. "Why did not he," he writes, "why do not his avowed followers, measure (for each age and year) each of these independent faculties, memory, judgment, etc., one by one? To have made no attempt in this direction seems inconceivably illogical."[1] And in another place, he writes: "When Binet borrowed the idea of such promiscuous pooling, he carried it into execution with a brilliancy that perhaps no other living man could have matched. But on the theoretical side, he tried to get away too cheaply. *And this is the main cause of all the present trouble.*"[2]

Now what is the "theoretical" sin of Binet? And what is the "present trouble"? The sin of Binet, according to Spearman, is that he did not recognise *one* factor only in intelligence. Look down his tests for young children,[3] and you will realise that they are merely designed to find out how "knowing" the children are. Not in *one* department

[1] Spearman, *The Abilities of Man*, p. 24.
[2] *Op. cit.*, p. 71. [3] Facing p. 384.

of cognitive activity, but in all. Some of them largely depend on memory; some are chiefly perceptual; some deal with budding concepts; and some seem chiefly to depend on the span of attention. All of them, of course, deal with the ability to understand common words and sentences, and to use the same; in this sense, they are all both perceptual and conceptual in character. Binet realised that the "intelligence" he was measuring was *general cognitive efficiency*; and he made a "hotchpot" of his tests probably because he realised that "intelligence" may depend on many cognitive processes.

The "present trouble" has not been created by Binet, but by Spearman, who desires to identify "intelligence" with *one* factor which participates in all cognitive processes, though in different degrees in different processes, and which he symbolises by *g*. It remains to give a brief sketch of how Spearman arrives at his position.

The experimental work done by each of Spearman's pupils consists of a series of tests given to a class of pupils, or "testees," as we may call them, each test consisting of a number of exercises of the same kind, but differing substantially in character from those of the other tests. The pupils are arranged in order of merit on the results of each test. If the order were exactly the same for two tests, we should be able to say that the "correlation" between them was perfect, and designate it by the figure 1. In actual practice, of course, such a coefficient of correlation would not occur. But ·8 or ·7, which have occurred, indicate a high degree of correlation, especially when we remember that in any particular test, the number of testees is limited and that there may be many disturbing conditions. Now with a series of tests to the same pupils, it has often been found that the tests can be arranged in a descending order in conformity with the correlations between them. If the names of the tests are tabulated in this order both vertically and horizontally, the coefficient of correlation between every test and each of the others can be given at the appropriate place, each coefficient occurring twice.

Professor Spearman gives the following table as typical, though it is not an actual one.

	Opposites.	Completion.	Memory	Discrimination.	Cancellation.
Opposites ...		·80	·60	·30	·30
Completion ...	·80		·48	·24	·24
Memory ...	·60	·48		·18	·18
Discrimination	·30	·24	·18		·09
Cancellation ...	·30	·24	·18	·09	

We cannot here give details of all the tests. In the case of *opposites*, the pupils are asked to write down a word which is opposite in meaning to each of the printed ones (after the working of one or two instances on the blackboard). Thus *old* would require the answer *young*; *poor* the answer *rich*; and so on for about fifty words.

In a *completion* test, each pupil is asked to underline the word that makes the best sense, wherever there are three printed one above another, in such a sentence as—

green green
Grass is wet, but the sky is wet.
blue blue

This, of course, is a very simple example. There may be as many as twenty-five—some considerably more difficult. For further examples the reader should consult the special books on the subject.[1]

Now such a table as that given above constitutes a *hierarchy of correlations*. But it is, further, a hierarchy of special definiteness. If any rectangle which has a number in each of the four corners be taken in the table, it will be found that the product formed by multiplying the number

[1] See *Psychological Tests of Educable Capacity* (Board of Education), pp. 192-4 for books, and pp. 199-219 for examples.

in one corner by that in the *opposite* corner will be equal to the product of the two numbers in the other corners. Thus, if we take the rectangle formed by "Completion," "Memory," and "Discrimination" right across we get:—

$$\cdot 80 \times \cdot 09 = \cdot 30 \times \cdot 24 \text{ (}\cdot 0072\text{ in each case).}$$

If we take the same three tests, but cut off our rectangle by the perpendicular completing the third column, we get:—

$$\cdot 80 \times \cdot 18 = \cdot 30 \times \cdot 48 \text{ (}\cdot 0144\text{ in each case).}$$

If we take the rectangle formed by "Opposites," "Completion," "Memory," and "Discrimination,' but cutting out the first column (since there is no number in the top left-hand corner), we get:—

$$\cdot 80 \times \cdot 09 = \cdot 24 \times \cdot 30 \text{ (}\cdot 0072\text{ in each case).}$$

Such equations are called by Spearman *tetrad equations.* He prefers, however, to express them with the numbers all on one side, thus:—

$$\cdot 80 \times \cdot 09 - \cdot 24 \times \cdot 30 = 0.$$

In actual tests, the above exactitude is not attained. A limited number of testees can scarcely ever be a fair sample of all. A given pupil may be somewhat "above himself" in one test and "below himself" in another. Mathematical means of making due allowance for such variations have been invented. And many actual series of tests treated in this way have produced tetrad equations with a value approximating to 0.

Now Spearman tells us that "whenever the tetrad equation holds throughout any table of correlations, and *only* when it does so, then every individual measurement of every ability (or of any other variable that enters into the table) can be divided into two independent parts which possess the following momentous properties. The one part has been called the 'general factor,' and denoted by the letter g; it is so named because, although varying freely from individual to individual, it remains the same for any one individual in respect of all the correlated abilities. The second part has been called the 'specific factor,' and

denoted by the letter *s*. It not only varies from individual to individual, but even for any one individual from each ability to another." [1]

It should be noted that when two tests are very similar, not only is the *g* factor the same in each, but the *s* of each may be largely the same as that of the other. Thus, if one test consists of the cancellation of all the a's on a printed page and a second of cancelling all the e's, there will be a great deal that is common to the two *s's*. And the correlation between the two tests will be very high indeed. If both are introduced into a table of correlations, the tetrad equation will not be satisfied, *i.e.* it will not give the significant O. Any *s's* which overlap in two or more performances are called *group factors*. Professor Spearman warns us that we must not decide as to the similarity or dissimilarity of the two *s's* in two tests by "intuition." We must try the tetrad equation. If that gives approximately O (after making allowances for unavoidable variations), then we may take it that the *s's* are different for the two performances.

As to what *g* measures, we have already pointed out that Spearman has little that is definite to tell us. In one place, he writes: "Eventually we may or may not find reason to conclude that *g* measures something that can appropriately be called 'intelligence.'" [2] In another place he tells us that "there is urgent need of framing—however tentatively and provisionally—some or other explanatory hypothesis." [3] And he goes on to suggest that *g* may possibly be regarded "as measuring something analogous to an 'energy'; that is to say, it is some force capable of being transferred from one mental operation to another different one." [4] Why he should speak of it as "capable of being *transferred*" is not very clear. One would have thought some such phrase as "*inherent* in greater or less degree in every mental operation" more suitable. He

[1] *The Abilities of Man*, pp. 74-75.
[2] *Op. cit.*, p. 76.
[3] *Op. cit.*, p. 414.
[4] *Ibid.*

finishes, however, by saying: "Even on the physiological side, there are some grounds for hoping that some such energy will sooner or later be discovered in the nervous system, especially the cerebral cortex." [1]

We have already noted that g may represent not *one* factor, but the efficiency of a *number* of factors of cognition.[2] Professor Godfrey Thomson has shown that a hierarchy among correlations need not necessarily imply that there is a single factor, but may be produced by a group of primitive abilities acting together as one unit, like a team.[3]

As to the various *s's*, Spearman points out that "every *s* is independent of every other one, unless the two operations are closely similar." [4] And he remarks that this rules out such a factor as "attention," since this enters into *every* mental process. In this connection, it may be noted that some writers are disposed to identify attention with g. "Professor W. McDougall, who is a firm believer in the doctrine of mental energy, has further attempted to define this feature of all cognitive processes as 'the power of the individual to concentrate his available energy effectively on the task in hand.'" [5] But, once again, we ask: Of what nature are these *s's*? All that Professor Spearman can tell us is that "the chief constituents seem to derive from any sensory or motor apparatus that happens to come into play, or else from some influence of retentivity." [6]

These seem rather barren results. And some critics have shown a disposition to speak disparagingly of them. Thus Köhler writes:—

"If we now ask ourselves what problems about the processes underlying intelligent behaviour we are solving by our tests, not many of us will have an answer ready. But some will answer that from now on, intelligence shall

[1] *Ibid.* [2] See pp. 435 ff.
[3] See "General and Group Factors in Mental Ability" (Psychological Review, 1920).
[4] *Op. cit.*, p. 413. [5] Fox, *Educational Psychology*, pp. 392-3.
[6] *Op. cit.*, pp. 413-414.

be defined as the X[1] which is measured by those tests and that measuring is more scientific than grubbing among the unknown functions of the nervous system. The fact is that we are not in the habit of asking questions about the underlying processes in psychology, questions similar to those in which the whole interest of physicists is centered. Instead of imitating the very kernel of physics, we assume merely the outer, quantitative form of exact science. Think of a physicist interested in all types of motors who would restrict his study of them to the following tests to be applied to all the various types: measurement of their volume, of temperature of their surface, of ionisation of the air in their neighbourhood, of their actual frequency of revolution, and of the total weight of the bodies; who would calculate from these data an average 'power-coefficient' for each of them, define 'power' by the method, never ask a question about the working process in their interior, and remain satisfied by this quantitative procedure for many years. I know I am exaggerating in some respects if I compare intelligence testing with such an attitude. I do it intentionally in order to call attention to the main point, viz. that admiration for quantitative method leads us almost exclusively to those research tasks which immediately afford us an opportunity of measurement."[2]

Spearman, on the other hand, calls his discovery of *g* "a Copernican revolution in point of view."[3] And, although his researches, and those of his pupils, have failed to determine what this letter represents, we must agree that those researches have been extremely fruitful, and have thrown much light on the cognitive activities of the mind. Further, they have stimulated others to investigate the *s*'s.

Thus, a younger psychologist, Dr. J. W. Cox, has got to work on these *s*'s, and has shown by carefully designed

[1] "X" here represents the *g* of Spearman; it should not be confused with another "X" to which we shall refer later.

[2] Köhler, *Gestalt Psychology*, pp. 36-7.

[3] *The Abilities of Man*, p. 411.

tests that an important *group factor* exists among these. This factor he calls *mechanical aptitude.* Dr. Cox has devised tests which "consist of mechanical models, in which the testee is required to discover how certain of the observed parts are mechanically linked together; of diagrams, which require the testee to discover how various parts of the mechanism work in response to movements imparted to other parts, and of papers of questions which call for the solution of various mechanical problems."[1] The inter-correlations between the results of these tests show "that a person's success depended upon (*a*) a *general* factor which helped him in both the mechanical and the non-mechanical activities; (*b*) a *special* factor which helped in the mechanical group of activities only (hence known as Z *group* factor); and (*c*) a *specific* factor (or factors) which operated only in the particular test in which it occurred."[2]

The first of these factors, (*a*), is Spearman's *g*. The second, (*b*), is an "*s*" which connotes *mechanical aptitude,* and is a general manual factor which enters in greater or less degree into all manual operations. For very simple manual work of a repetitive nature, neither *g* nor this factor of mechanical aptitude are prominent factors: some *specific* factor, like (*c*) above, is the chief element. Thus sticking labels on bottles, or folding paper in a certain way, would involve little intelligence and little mechanical aptitude. But assembling and wiring electric lampholders would require considerable mechanical aptitude. And mending a watch would probably necessitate still more of this aptitude, as well as of *g*.

Now intelligence tests have been devised, and are continually being invented and used, to determine the amount of *g* possessed by candidates at scholarship examinations. As we have already noted, such tests are very useful in

[1] Fuller particulars can be obtained by application to Dr. Cox (c/o Messrs. Methuen and Co.). The quotation is from an article on the subject by Dr. Cox in the Handbook to the Easter Conference, 1936, of the Institute of Handicraft.

[2] Cox, *op. cit.*

eliminating mediocre candidates who have been "crammed" for the ordinary scholastic tests. But many higher schools have alternative courses especially in their upper years. Thus some central schools have technical and commercial sides. Many secondary schools provide differentiated courses, some more academic and some more practical. Further, we have a considerable number of technical schools, which provide secondary courses of a distinctly practical kind. Now the tendency in the past has been to put the more intelligent boys on the academic side and the duller ones on the practical side. One reason for this preference for academic courses is that until recently the better posts in business were given to boys of the academic type. But with the coming of the motor car, the aeroplane, and wireless, the value of technical ability, at least in the higher branches of industry, is being more and more appreciated. There is, further, the consideration that a boy will be happiest as a man, if he finds the work for which he is most suited. And the country will be best served if all are in their right places. Much more care should therefore be exercised in differentiating between pupils for the various courses.

Dr. Cox has adopted the letter *m* for mechanical aptitude. And he insists that this aptitude should be much more carefully estimated in our pupils than it has been hitherto. "Too frequently," he writes, "the only knowledge of the pupil available is his performance at a purely academic examination together with, possibly, his score at a general intelligence test."[1] There should therefore be tests in mechanical aptitude as well as in general intelligence. And we should classify our pupils on the basis of both tests. Recognising three grades for each of the two tests, we could divide the pupils into nine groups, as follows: $+m+g$; $+mg$; $+m-g$; $m+g$; mg; $m-g$; $-m+g$; $-mg$; $-m-g$ (the sign $+$ before a letter indicating the highest grade and the sign $-$ the lowest grade).

[1] *Ibid.*

With the more definite knowledge of our pupils' abilities thus obtained, and with a real desire to eliminate the bias in favour of academic subjects which has characterised our educational system hitherto, we could go very far along the road towards the utilisation of all the powers of the rising generation. What, for instance, should be done with a boy of the group $+ m + g$? Such cases of high mechanical ability combined with a high degree of intelligence are comparatively rare. Too often a boy of this type is wasted. In many a secondary school, the general intelligence shown by such a boy causes him to be drafted into an academic class; he obtains his matriculation, and passes out to a post in a bank or an insurance office, where he vegetates for the rest of his life. But a boy of these abilities is fitted for the higher branches of engineering, of architecture, or of surgery, not to mention many other professions. Too often the limited means of his parents will be the chief reason for pushing him out into some more or less "respectable" post as soon as possible. There is little doubt that more "intermediate" scholarships are required to assist parents of brilliant boys in keeping them at a school or college where they can follow their vocational bent. The writer has in mind one such whose parents were able to send him on to a school of architecture. In the ordinary course of events, this boy, after gaining his matriculation, would have obtained a clerical post and would now, at the age of thirty, be earning about £6 or £7 a week. Instead of this, he is a managing architect with a salary considerably more than twice as much. And he is sufficiently conscious of his ability to declare that he is willing to hand over his job to any of his subordinates who can do it as well. *There is plenty of room at the top.* This young man is far from being a boaster. He has obtained his post, and holds it, by sheer ability. His chief, who "makes" about ten times as much as he—whether that is just we will not here inquire—pays him only what is absolutely necessary to retain his services.

We cannot here consider each of the nine classes we have specified. We may, however, deal briefly with one or two. What should be done with the boy who has poor mechanical aptitude but is of high intelligence ($-m+g$)? Obviously he should go on the academic side. And what of a boy who has a high degree of mechanical aptitude, but only average intelligence ($+mg$)? Such a boy should certainly take a technical course. He is not likely to do so well as the first boy we considered; but he is bound to be happy at work in which his high mechanical aptitude will assist him. And lastly, let us take one more case. What of the boy who is moderately endowed with respect to both mechanical aptitude and general intelligence? With respect to such cases, there will be considerable hesitation between a technical and an academic course. The wishes of the boy may be taken into account. But it must be borne in mind that often a boy evinces a preference for a given course of study without having any special aptitude for it. Relatives or friends may be entering that particular branch, and the boy in question may wish to be with them. Such considerations should carry little weight where more definite criteria are available. And there is at any rate one—*verbal ability.* If the boy has a high degree of this, he should take the academic course. If he has not, he would do well to take the technical course.

Fortunately verbal ability is usually obvious. It shows itself in both speech and written exercises. It has been recognised as a *special group factor*[1]—independent of g. There is little doubt that in the past this verbal factor—which we may represent by v—has had too great an influence in school education. Let us admit that speech and thought go hand in hand. We have already shown that words play an extremely important part in the growth and development of abstract ideas.[2] We may well insist that the complexity of thought of which the human race is capable

[1] See *Intelligence, Concrete and Abstract,* by W. P. Alexander.
[2] See pp. 129 ff.

is largely due to the growth of language. But, on the other hand, we must remember that thought can go on without words. Helen Keller, who has been blind, deaf, and dumb throughout her life, has taken a university degree. It is true that sensations of other senses—kinaesthetic, tactual, olfactory, and organic—can be used as centres of meaning in much the same way as words. But it seems possible that, when once a certain standard of thought has been reached, further directions of attention to aspects and relations can be made without any definite support from sensations or images. It is possible, at any rate, to approximate to "pure" thought. The person of high mechanical ability who examines an intricate piece of mechanism and arrives at an understanding of its working seems to be able to apprehend the relations between the parts without the use of any words. In some cases, indeed, he is unable to explain what he understands to others.

While, therefore, we may agree that in a great many spheres of thought, understanding and language go hand in hand, so that he who comprehends thoroughly can explain clearly and he who cannot explain clearly must be assumed to be confused in thought, it remains true that thought may outrun speech and speech may be fairly profuse while thought is limited. What we desire here to insist upon is that verbal ability seems to be a special group factor. There are people who evince great appropriateness of diction in the ordinary affairs of life without possessing any appreciable power of independent thought. There have even been geniuses in verbal ability who have shown obvious weakness in understanding. We read of Goethe that "although he studied Newton's theory (of light) and experimented for himself he never came to understand the matter, but displayed a childish ignorance and lack of science." [1]

Seeing that so much of our thought is accompanied by words, it is extremely difficult to distinguish between *g* and

[1] Victoria Hazlitt, *Ability*, p. 73.

verbal ability. Some have criticised Binet's tests, not to mention many similar ones, on the ground that they depend largely on the verbal factor. The difficulty is that words are the usual means of communication, as well as essential aids to much of our thought.

Language being the supreme means of teaching, of persuasion, of control, and of administration, has attained a position of immense importance in modern society. Leaders and directors in almost all spheres of human activity carry out their functions and attain their ends largely by its use. It is not surprising, therefore, that verbal ability has taken such a predominant place in our schools. There seems to be a danger that it will obscure the estimation of g. And it is important that all so-called intelligence tests shall contain a good proportion of "performance" tests, of things to be *done* as well of things to be *said*. These consist of operations to be done either after receiving instructions (in which, once again, words can scarcely be avoided) or after seeing a similar thing done by the experimenter. Examples are the fitting of insets into holes made to fit them and the fitting together of the pieces of a puzzle-picture. It is important to distinguish such "performance" tests (which can be set to very young children) from the "mechanical-aptitude" tests previously described. The former are part of the search for "g"; the latter are special tests to estimate the group factor m.

Returning now to intelligence tests, we may note that these have now definitely established their utility in education, and are widely used. Not, be it observed, as a means of psychological analysis of cognitive processes, but as "behaviourist" tests to estimate the value of g in each testee. The original Binet-Simon tests of 1911 are still often used. But various modifications of them have from time to time been made. Professor Burt, our leading authority on this kind of testing, recommends that any changes made should be either of a minor kind, leaving the tests largely as they were, or of a sweeping character, making a new set of tests. He himself has followed the

latter course in framing a set of reasoning tests on the ground that these are a very reliable means of measuring *g*.[1] Terman, of Stanford University, has taken the former course, and has produced the *Stanford Revision Tests.* Recently there has appeared a *New Terman Revision of the Binet-Stanford Tests*,[2] and we are told: "This new Revision contains two equivalent scales and is far more reliable than the earlier test for very young children and for the older age groups."

It is now quite common to speak of the *Intelligence Quotient* or *Mental Ratio* of a child. This is found by

I. Q.	Percentage of children possessing it.	Remarks.
200	Very rare	Denotes genius.
150	·02%	Fit for Secondary School and University.
130–150	2–3%	Win Junior Scholarships—go to Secondary School but not to University.
115–130	10%	Just miss Scholarships—go to Central Schools.
100–115	38%	Good average for Elementary Schools.
85–100	38%	Poor average.
70–85	10%	"Dull and backward."
50–70	1·5%	Feeble-minded.
Below 50	·5%	Idiot and imbecile.

dividing the mental age as shown in the tests by the chronological age and multiplying by 100. Thus, if a child of six is able to respond to the tests correctly up to those for the age of eight, his Intelligence Quotient, or I. Q., as it is called, is $\frac{8 \times 100}{6}$, *i.e.* 133. If, however, a child of the same chronological age cannot go beyond the tests for the

[1] Dr. Cyril Burt, *Mental and Scholastic Tests.*

[2] Published by Harrap and Co., High Holborn, W.C. 1.

age of four years, his I. Q. is $\frac{4 \times 100}{6} = 66$. The g of an "average" child would, of course, be represented by 100. Dr. Burt has given us a table (on p. 449), based on much experience of testing, and indicating the ways in which we should classify children according to their respective I. Q.'s. It may be noted in passing that if Dr. Burt's "remarks" were observed and followed, we should send to the university only one in every 5000 of the children in our primary schools, and one great university such as Cambridge would suffice for the whole country. Dr. Burt's requirements in intelligence for the university are obviously too high. Mr. Alexander is nearer the mark when he says: "It is probably true that for success in secondary school work an I. Q. about 110 is desirable as a minimum. For University work we should hope the minimum would be about 115 to 120. Actually there is no doubt that we have at present in our secondary schools many pupils not up to that standard. The same holds for our Universities. It is equally true that there are many pupils who are above these levels who do not go to secondary school or to University. This latter fact is one that should concern us greatly, since there is a real national loss involved here." [1]

According to Spearman—and there seems to be general agreement among psychologists on this point—when once g has been accurately measured, and the I. Q. determined,

[1] W. P. Alexander, *op. cit.* These statements were made in the early type-written copy of Mr. Alexander's thesis. In the printed edition (1935) they are not to be found. Mr. Alexander appears to have modified his views. We find, for instance, in his Handbook of Instructions for administering the "Thanet Mental Tests" (University of London Press, 1937) the statement: "As a basis of recommendation to a Secondary School where the number of places is adequate it is suggested that a pupil should have an I.Q. not below 115 and preferably above 120, and in addition should have a score in English and Arithmetic not below the average." Thus Mr. Alexander now requires for Secondary work the minimum of intelligence which he formerly laid down for University work. Even these requirements, however, are considerably below those of Dr. Burt.

there is no hope of subsequent variation: a further test at a later age, if accurately performed, would give approximately the same I. Q. Thus, if a child were tested at the age of eleven and were found to have an I. Q. of 100, and then were tested again at the age of fifteen, although he would answer more advanced questions, his I. Q. would still be found to be approximately 100. "If once, then, a child of eleven years or so has had his relative amount of *g* measured in a really accurate manner, the hope of teachers and parents that he will ever rise to a much higher standing as a late-bloomer would seem to be illusory."[1]

This general truth may appear depressing to some teachers. What, they will ask, is the good of education, if it cannot improve the "intelligence" of our pupils?

In the first place, we may note that by education we can immeasurably increase what we have called the "total intelligence" of our pupils. We can provide them with tools of knowledge and skill whereby they will become far more efficient warriors in the battle of life than they otherwise would be. Reading, writing, and arithmetic in the elementary school will, with the aid of the other subjects taught, enable the child of ordinary intelligence to become a useful member of society. And mathematics, history, geography, French, and the other subjects of the secondary school will equip the child of superior intelligence to perform some of the higher duties necessary to the community. Without these tools, even the genius in intelligence would be powerless, and would go down to the grave with the epitaph of the poet—

> "Some mute inglorious Milton here may rest."

But, secondly, it must be borne in mind that there are "*s's*." And in many branches of activity, they are more important than *g*. It is true that in certain highly intellectual spheres, *g* plays the predominant part. Thus according to Spearman certain psychological correlations showed *g* to have the highest importance in the talent for

[1] Spearman, *The Abilities of Man*, p. 367.

classics, where the ratio of g to that of s was rated to be as much as 15 to 1. At the other extreme was the talent for music, where the ratio was only 1 to 4." [1] The reader will probably agree that the theory of education demands a high proportion of g. The writer remembers a training-college student who, though brilliant in music, was very weak in the theory of education, as shown by his papers in the usual college examinations. Nevertheless this student applied for admission to an optional advanced course in education. Not wishing to hurt his feelings by giving a candid opinion of his "intelligence," the writer pointed out that his duties as accompanist at the various concerts would necessitate a large amount of time for practice. The student replied that he gave no time to practice, and that he played everything *at sight!*

According to another experimenter,[2] *verbal ability* is far more important than g in English, the ratio of g to v in this subject being as 10 is to 63. Even in mathematics, this writer finds that v has a considerable share, the ratio of g to v being as 31 is to 19. In practical work, the same writer has no place for v, but assigns great importance to a factor which he calls F, and which is not unlike Dr. Cox's *m*, though more general than the latter.[3] His ratio of g to F in this branch of work is as 10 is to 13.

Further hope for those who are not very strong in g may be sought in the dictum of Spearman: "Every normal man, woman, and child is . . . a genius at something, as well as an idiot at something." [4] But he immediately adds: "It remains to discover *what*—at any rate in respect to the genius," [5] And he tells us further: "It certainly cannot be detected by any of the testing procedures at present in current usage; but these procedures seem to be susceptible of vast improvement." [6] When, however, he adds, speaking of the unemployed, that "perhaps every one of these

[1] *Op. cit.*, p. 76. [2] W. P. Alexander, *op. cit.*

[3] "'F' is the factor which along with 'g' functions in performance tests of intelligence." (Alexander, *op. cit.*)

[4] *The Abilities of Man*, p. 221. [5] *Ibid.* [6] *Ibid.*

persons could at any rate do something that would make him a treasure in some great industrial concern,"[1] we may be permitted to doubt. The sooner we realise that some are born to be hewers of wood and drawers of water, that these will be happier as such, and that all education can do for them is to make them efficient in that capacity and worthy members of society in that lowly sphere, the better.

There is, however, one final source of hope, at any rate for those who have a fair amount of *g*. We have all read the fable of *The Hare and the Tortoise*, and we realise the importance of *persistence*. "Long-term persistence" Mr. Alexander calls it, though this expression seems rather tautological. Persistence may be due to a strong interest in the subject or group of subjects concerned; it may be due to a powerful self-regarding sentiment involving a high sense of duty and great force of self-assertion. But whatever the group of conations producing it, we may sum it up broadly as a powerful factor in *character*. And experience and history give us innumerable instances of men of character who, without possessing the highest intellectual powers, have gone farther in certain pursuits than others of greater gifts but with less persistence.

"But how can character be measured?" asks Mr. Alexander. And he adds: "It cannot yet be done."[2] We know that it has a great influence on our work, but we find great difficulty in defining and estimating it. The attempt has, however, been made by Spearman with Dr. Webb as his assistant. Using the letter *w* to designate the factor, Spearman tells us: "Still another great functional unity has revealed its existence; this, although not in itself of cognitive nature, yet has a dominating influence upon all exercise or even estimation of cognitive ability."[3] And the best term he can find for it is "self-control."

It is not possible here to give full details of the investigation conducted by Dr. Webb. "His principal subjects

[1] *Ibid.* [2] In *Methods of Selection for Post-Primary Education.*
[3] *The Abilities of Man*, p. 413.

were 200 students with an average age of 21 years. . . . The students were divided into groups of 20, each of which was kept for several months under the continual observation of two prefects (students themselves). At the start, these prefects studied the subjects in whatever way seemed best to themselves and summed up the result for each subject in the form of a general character sketch. They were then supplied with a schedule of all the traits to be investigated specially, and they had to mark each subject for each trait on a scale running from + 3 to − 3."[1] The more purely intellectual traits estimated were those of *profoundness*, *quickness*, *common sense*, and *originality*. When these estimates were correlated with the results of a test for g and with the results of the college examinations, the table of correlations did *not* show a hierarchy such as that of page 438. The tetrad equations did *not* hold. Hence it was inferred that some other factor than g was involved. Similar correlation work on estimates of other traits—conative rather than cognitive—indicated "a general character-factor" which Webb called w. Returning now to the correlations of the estimates of the intellectual traits, Webb noted a correlation reaching "the extraordinary value of 1·00" between the estimates of "profoundness" and "common sense." And when these estimates were brought into relation with the estimates of no less than forty-one "character" traits, "good" and "bad," high positive correlations were found with the "good" and negative ones with the "bad." Thus "profoundness" showed a positive correlation with "perseverance, as opposed to wilful changeability" of ·75, and "common sense" with the same "character" trait gave ·71. With "perseverance in face of obstacles" the correlations of these two intellectual traits were respectively ·72 and ·77. But with "oscillation of mood" "profoundness" gave a *negative* correlation, the figure being − ·48, while "common sense" gave − ·51; and with "offensive self-esteem"

[1] *The Abilities of Man*, p. 345.

"profoundness" gave − ·28 and "common sense" − ·49. These, of course, are only a few examples from among many results. From all the correlations studied it was inferred that "profoundness" and "common sense" were not purely intellectual traits, but involved a combination of *g* and *w*, and that the failure of the original table of correlations to show a hierarchy was due to the "interference" of *w*.

We have sketched only a portion of the investigation. But even this is sufficient to indicate the difficulty of any attempt to measure character and to estimate its relations with *g*. Character, embracing as it does pre-eminently the conative and emotional side of mind, is at least as difficult to define as "intelligence" on the cognitive side, and far more difficult to measure. This, at any rate, is the opinion of Mr. Alexander, who in dealing with the selection of pupils for post-primary education considers it "reasonable to suggest that the head teacher and staff of the junior school, with four years' experience of the children, can make an assessment of that factor. The assessment," he continues, "should be made on a five-point scale, with a definite distribution of 5, 20, 50, 20, and 5 per cent."[1] Such marking would give a distribution similar to that illustrated for heights on page 390. Mr. Alexander goes on to assess the relative importance of the various factors in three subjects—representing practical ability by F and "character" by X—as follows:—

Subject.	*g*	*v*	F.	X.
Practical work	10	0	13	43
English	10	63	0	23
Mathematics	31	19	0	48

If these figures, or anything approximating to them, can be accepted, we may conclude that persistence is more

[1] W. P. Alexander, *op. cit.*

important than g, and that, except in English, where the verbal factor is predominant, this persistence has a greater influence than any other factor. In another place, Mr. Alexander tells us: "In actual success in school or in vocation the importance of 'g' and 'v' and 'F' is not as great as we have thought."[1] And he assigns the chief place to X. "We find," he says, "that X is more important than any of the other factors in school achievement. In most school work 'v' comes next in importance."[2] And he adds: "The formulation of a measure of X would enable us to forecast achievement in these various fields with almost twice as much accuracy as we are now able to do."[3]

Bearing these considerations in mind, Mr. Alexander suggests "that where it is impossible to institute the use of largely individual methods of instruction, it would be better to make the groupings take account of 'v,' 'F' and X rather than 'g.'"[4] And he suggests that in our junior schools we should divide up our children as follows:—

Group A. Verbal, high X (Persistent academic group).

Group B. Practical, high X (Persistent practical group).

Group C. Verbal, low X (Academic group lacking persistence).

Group D. Practical, low X (Practical group lacking persistence).

He is no less emphatic than Dr. Cox in insisting on catering for the "practical" pupils. He believes, indeed, that our teaching methods should be different according as the pupils are "practical" or "verbal." "Only," he says, "when one has seen pupils at handicraft work and become conscious of their great satisfaction and benefit from it can one realise that in such work lies a great educational method. We have long thought that education was a matter of words. 'V' is not the only psychological factor

[1] W. P. Alexander, *Intelligence, Concrete and Abstract.*
[2] *Op. cit.* [3] *Op. cit.* [4] *Op. cit.*

other than 'g.' The existence of 'F' is a matter that should be taken into account in the schools of the nation."[1]

These, perhaps, are dreams of the future. The solid fact remains that *g* is a well-established factor for all psychologists, and is being measured by means of Binet's tests by hundreds of educational workers. Whatever degree of accuracy may be achieved in measuring the other factors, we do well to perfect, as far as is humanly possible, this first instrument of measurement. We have already mentioned the new Terman Revision Tests. These are often referred to as the *Terman-Merrill Revision of the Binet-Simon Tests*. In January of the current year,[2] the National Institute of Industrial Psychology arranged a conference of psychologists to consider means of further improvement. It was pointed out that certain Americanisms were unsuitable to English children, and that some of the pictures should be re-drawn. It was finally agreed "to form a committee to investigate the problem of preparing an English version of the Terman-Merrill Scale." This Committee has already started work under the Chairmanship of Professor Cyril Burt. And we may soon have a still better instrument for measuring *g*.

Now these tests can be properly conducted only by a fairly expert psychologist, and they necessitate much time. In 1913 the present writer took two weeks to test about 90 young children in an infant school. It is doubtful whether we shall ever have enough experts to deal with all children in this way. But there is an alternative—at least for ordinary cases. *Group tests* can be used as soon as children can read and write with some facility, and they can be given by ordinary teachers. We have already referred to these tests.[3] A few more words may not be out of place. During the Great War, it was found necessary in America to test the recruits for the army in order to decide on the rank and nature of service suitable for each. A group of American psychologists framed a series of tests

[1] *Op. cit.* [2] 1938. [3] See p. 379.

which were checked by comparing their results with those obtained from subjects who had already been examined in other ways—by individual tests, by teachers' estimates, and by officers' ratings. These tests received the name of *Army Alpha Group Tests.* They were applied to nearly one and three-quarter million men. The correlation coefficient with the results of Binet tests was found to be from ·8 to ·9. Much interesting work has been done on the results of the Alpha Tests. In the American army there were recruits of many nationalities. Brigham has worked out the percentages of each nationality that exceed the average native white American, and finds them to be as follows:—

England	63	Denmark	48	Belgium	35	Greece	21
Scotland	59	Canada	47	Austria	28	Russia	19
Holland	58	Sweden	42	Ireland	26	Italy	14
Germany	49	Norway	37	Turkey	25	Poland	12

Many other interesting results have been obtained.[1]

These group tests have inspired other psychologists to construct many more. We may mention in particular the *Northumberland Mental Test* of Professor G. H. Thompson. Dr. Ballard in his book on *Group Tests of Intelligence* gives many others. We may cite as examples the *Chelsea Mental Tests* and the *Columbian Mental Tests.* These have been reprinted in pamphlet form by the publishers[2] for use in schools. The *Columbian* can be obtained at two shillings a dozen. The writer, when head of a central school, obtained four dozen copies of this test and got the teachers of the first-year classes to apply it to the pupils a short time after their entry into the school. The test takes only one hour, and there are a hundred questions in all. The mere total of correct answers thus gives a roughly approximate indication of the "intelligence" of the pupils. The lists from each class were preserved, and were often useful. Thus on one occasion a boy in his second year was caned by

[1] See *The Abilities of Man,* Chap. XXII.
[2] Hodder and Stoughton, Ltd.

his master for exceedingly bad home-work in algebra. His mother came up to complain to the Headmaster. The writer referred to the Punishment Book and found that a second boy had at the same time received exactly the same punishment for a similar offence. This boy had made no complaint: he admitted that he richly deserved his punishment. The mother of the first boy was still obdurate, and asked for permission to withdraw her son from the central school and send him back to the ordinary elementary school. The Headmaster pointed out that he had no authority to give such permission, but gave her the address of the Education Officer. She wrote to the Head Office, and in due course her letter was sent to the Headmaster for his observations. Meanwhile he had looked into the records of the boy. He found that at the previous half-yearly examination this pupil was second from the bottom. But in the Columbian Mental Test he was *second from the top!* The boy appeared to have very good ability but little persistence. In those days "X" was unknown as a definite factor. Even now we are somewhat uncertain about it: we cannot say that it is a definite factor like *g* which must be accepted as final, with no chance of improvement. Be that as it may, the Headmaster decided that this boy was lazy, and should not be allowed the soft option of returning to his elementary school, where he could keep a good place without making any effort. The Education Officer was informed accordingly, and he refused permission to transfer the boy. But the mother returned to the charge, and claimed that her boy was too delicate to stand the strain of a central-school course. The Education Officer therefore arranged for a special medical examination of the boy, and the Headmaster was instructed to send the medical card of the pupil to the school doctor. This he did without making any comment on the reason for the examination. In due course the card was returned to the school with the entry: "Perfectly healthy and quite fit for central school." The boy finally came back to school and applied himself to his work with some improvement in zeal.

The intelligence tests which are now often set as an additional paper at scholarship examinations are further examples of group tests. The reason why so many are required is that when once a test is known and has been practised, it is of no use for the same pupils. If only a few such tests existed and were known to teachers, there would be a tendency to practise the pupils upon them in preparation for the scholarship test. The chief difficulties in framing these tests lie in avoiding all special knowledge, and in making the questions sufficiently hard to eliminate the dull, but not so exacting as to "stump" a very large number. If a question fails to find an answer, it is obviously out of place. If a question can be answered by all, it is equally out of place. There should be a gradation in difficulty. Some of the questions should be of such difficulty that most children of good intelligence can answer them. Some should be rather more difficult and susceptible of answers from children of only superior intelligence. Here, for instance, is such a question.

John said: "I heard my clock strike yesterday, ten minutes before the first gun fired. I did not count the strokes; but I am sure it struck more than once, and I think it struck an odd number."

John was out all the morning, and his clock stopped at five to five the same afternoon.

When do you think the first gun fired?

Perhaps one question could be introduced of such difficulty that only a very exceptional child would be able to tackle it. But this would require much care. The writer remembers drawing up an intelligence test for the scholarship examination of a county education authority, and introducing such a question. He received a letter from the Secretary to the effect that nobody in the office could answer the question and that it had consequently been cut out!

The prognostic value of these group tests of intelligence has been shown by a recent investigation in an English county. About 120 scholarship pupils were "followed up" during a period of five years in different secondary schools.

Each year the progress of these pupils was assessed by their teachers, and at the end of the five years a special assessment was made. These assessments were found to correspond closely with the results of the School Certificate Examination. Finally the correlation coefficients between the separate subjects of the entrance examination and the final school assessments were calculated and were found to be as follows: Arithmetic ·25, English ·42, Intelligence test ·48. "When the marks of the scholastic and intelligence tests were combined the coefficient was found to be ·53. Hence the intelligence test has most predictive value and arithmetic least; whilst a combination of scholastic and mental tests is best of all." [1]

And what of "X"? What about those elements of character which produce persistence? According to Alexander, this overshadows all else. It is true that in many cases some kind of estimate is asked for from the head teacher of the elementary school. But, unless a definite form of assessment such as the five-point scale, *with a definite distribution*, as suggested by Alexander, is insisted on, there is a danger of giving little weight to these estimates and attaching chief importance to the figures which give definite information with regard to the more intellectual factors.

Due attention is given to "X" only in special cases. We all tend to be obsessed by the *numbers* obtained in the other spheres. Thus, in the case of the "lazy" boy to whom reference has recently been made, we are inclined to regard marks obtained in examinations and in intelligence tests as representing definite factors, while the "laziness" is looked upon as an uncertain quality which does not correspond to any very definite element in the child's character. But is it so?

In these latter days, difficult cases are being investigated. *Child Guidance Clinics* are beginning to be established. The first in Great Britain was that of East London, founded

[1] C. Fox, *op. cit.*, p. 493.

in 1927. There now exists a *Child Guidance Council*[1] which encourages the work, and many clinics have been opened, especially in connection with hospitals. Mentally defective children are not treated in these institutions. The clinics exist for the treatment "of children who are in distress because of unsatisfied needs or who are at war with their surroundings. Such children often show peculiar character traits, undesirable behaviour and a general inability to fulfil the demands made upon them either at home or at school."[2] Children and young people from infancy to seventeen years may be treated.

The minimum staff of a clinic should include (1) the *psychiatrist*, an expert in psycho-analysis who should give at least six hours weekly, (2) the *psychologist*, who should also have had experience in teaching, and who should give at least two sessions per week, (3) the *social worker*, who is the only full-time member of the staff and is responsible for the administration, for organising a play room in which children can be observed, for keeping in touch with parents and, if necessary, for giving lectures to those interested, and (4) a *clerical assistant*.

The following is a typical case of a boy referred to one of these clinics[3] for treatment, reported by Dr. Mildred Creak, the Psychiatrist:—

> GEORGE M., age 10. Youngest child of a large family. Much illness during early school years, absent most of the winter. Individual coaching produces little improvement. Normal early development and not lacking in general intelligence but unable to read or recognise words. Severe reading disability associated with frequent absences. I. Q. 92.

On this case Dr. Creak remarks—

"This boy illustrates very well the severe handicap imposed on some children who miss out the early stages of

[1] Offices, Woburn House, Upper Woburn Place, W.C. 1.
[2] Pamphlet issued by the Child Guidance Council.
[3] The Maudsley Hospital Children's Out-Patient Department.

instruction. Here, I think, is superimposed a quite specific difficulty with printed and written symbols, and added to this is the attitude of the parents, who seem to have ceased to expect him to learn. The problem is to handle such a child in a large class, when, as you see, it has been exceedingly difficult to effect any improvement with hours of individual coaching. The treatment here will aim at two things. Firstly, and it is important that it should come first in time, work will have to be done to overcome the attitude of resistance to and inhibition of learning. It will be important for him to get some immediate success and, therefore, whatever remedial process is used, will have to be simple enough for him to solve successfully, preferably at the first effort. Coaching will inevitably include some drill with letters and sounds. Orton and his school in the U.S.A. use phonetic drill almost entirely. Others find this too tedious and exacting on the attention of a restless child, and substitute varieties of the 'look and say' method. The actual rapport between the child and teacher and the gradual gain in confidence is infinitely more important than any details of actual method." [1]

The chief impression the writer carried away from the hearing of the reports of such cases was the uncertainty of it all. As to the method of teaching reading it seems high time that the clinic should decide which is the more satisfactory. If the psychiatrist does not know much about the matter, she should leave it to the psychologist, who is supposed to have had experience in teaching. But in her own particular sphere she is scarcely more definite when she says that "work will have to be done to overcome the attitude of resistance to and inhibition of learning." Another report, this time on a boy of brilliant intelligence, finishes with the statement "that somehow he is still failing to function as adequately as he might." One cannot help being reminded of the humorous remarks of a

[1] From "Children who fail to learn," a paper read at the Conference of Educational Associations at University College, London, in January 1938.

writer who sometimes had a truth to impart with his jests. Speaking about "a general disinclination to work of any kind," he writes—

"What I suffer in that way no tongue can tell. From my earliest infancy I have been a martyr to it. As a boy, the disease hardly left me for a day. They did not know, then, that it was my liver. Medical science was in a far less advanced state than now, and they used to put it down to laziness.

"'Why, you skulking little devil, you,' they would say, 'get up and do something for your living, can't you?'—not knowing, of course, that I was ill.

"And they didn't give me pills; they gave me clumps on the side of the head. And strange as it may appear, those clumps on the head often cured me—for the time being. I have known one clump on the head have more effect on my liver, and make me feel more anxious to go straight away then and there, and do what was wanted to be done, without further loss of time, than a whole box of pills does now.

"You know it often is so—those simple, old-fashioned remedies are sometimes more efficacious than all the dispensary stuff."[1]

"Clumps on the head," of course, are a most improper form of punishment. But, under the old regime, the punishment of lazy and recalcitrant children often induced them "to get some immediate success." By all means let us study the characters of children. But let us bear in mind that psychology is distinct from ethics. The former is a science of what *is*; the latter is a philosophy of what *should be*. And while ethics must take psychology into account and in some measure conform to its data, the last word must be for ethics. There is some danger of our becoming so absorbed in the psychological study of difficult cases as to lose sight of the fact that we are dealing with vices, which must be checked at all costs.

One cannot help feeling that the realm of character is a vast expanse largely unexplored. McDougall and others have, by their studies of instincts, habits, and sentiments, given us bird's-eye views of it. But a detailed map is far to seek. It is refreshing, therefore, to note the words of Dr. Susan Isaacs in her paper on *Recent Advances in the*

[1] Jerome K. Jerome, *Three Men in a Boat.*

Psychology of Young Children.[1] "Nowadays," she says, "emphasis is on *development*, on a genetic approach to the problems of child psychology. There is a movement away from the measurement of traits as static units, whether by tests or by ratings, and a search for stable tendencies in a given, observable period of time, with definite patterns of variation, and as revealed in specific situations which are themselves to be studied, specified and regarded as a whole. Such research involves the study of the total organism, the child as a whole, and the study of the interplay of the various aspects of development within the developmental sequence."[2]

Many interesting observations made in recent investigations are reported by Dr. Isaacs. Thus it has been reported by Shirley in her work on the first two years of life[3] that there is a peak of shyness between the fifth and sixth months, and another at 18 to 20 months. According to the same writer, five months is an important and critical time in development. Before this time the child cries for physical reasons; later, social causes begin to appear in addition, and a child will cry if his mother goes out of the room. Some teachers may exhibit impatience with such information as this, pointing out that it is with older children that they have to do. But it must be emphasised that a thorough study of genetic psychology requires "*longitudinal*" observation. It is wrong to consider the child, however young, as a static mosaic of traits. Character is a growth, and we should endeavour to trace this growth from its earliest stages, and over long periods. A long-period investigation of this kind is reported from the Institute of Child Welfare, California. Nancy Bayley, the psychologist conducting this research, reports that "in the first two years, the course of development is fluctuating and unstable, and prediction of future achievement from

[1] At the Conference of Educational Associations (Jan. 1938).
[2] Report, p. 89.
[3] M. M. Shirley: *The First Two Years*, 3 vols. Univ. Minnesota Press, 1931, 1933.

apparent ability in that period is not fully reliable."[1] The same children have been kept under observation and periodically tested with regard to the various aspects of their development from birth until now six years. A similar piece of work for a later period of life has been going on at the Institute of Child Welfare at Berkeley. A group of boys and girls have been studied from the age of eleven to that of seventeen. "A wealth of important new facts regarding adolescent growth, and the inter-relation of the various aspects in the history of individuals, is likely to result."[2]

Psycho-analysis, of course, is frequently used in investigating difficulties, and Dr. Isaacs gives some interesting cases of "tantrums" and their causes. One difficult case was that of a boy of four who had lost his father and whose mother had to work very hard. It appears that the "tantrums" were due to more than one cause. His first screams were to call his father to come back and help his mother. Later he imagined his father alive again, and his loud voice and excited movement personified the father. Finally his storms were due to the idea that he was fighting the father, who would not come back and help. We thus see that intense anxiety and frustrated desires give rise not only to dreams but to day-time fancies.

A very different approach to the study of character is to be found in the recent book entitled *Personality and Will* by Dr. F. Aveling. This is of theoretical rather than of educational interest. Fortified by the results of the experimental researches of Ach[3], Michotte,[4] and Webb,[5] Dr. Aveling maintains that the will, in the higher forms of volition, is *free*. He does not agree with the account we have given on page 305. He maintains that there *is* an *ego* or *self* "sitting up aloft" which can decide the matter.

[1] Report of Conference of Educational Associations, p. 96.
[2] *Op. cit.*, p. 97.
[3] *Ueber die Willensttätigkeit und das Denken*, Göttingen, 1905.
[4] *Etude expérimentale sur le choix volontaire*, Louvain, 1910.
[5] See pp. 4?3 ff.

"Moreover," he says, "this 'I' reported by the observers (*i.e.* the persons giving their experience in volition) is not merely a thought or concept of the self. It is something directly lived and experienced; and it is this 'actual' factor which conditions the future activity . . . which the observer resolves then and there to carry out. According to Ach, this last experience is essential to all voluntary decision; for it is always experienced in truly willed acts."[1] Our answer to this contention is that all consciousness includes consciousness *of self.* All our mental processes, whether they are predominantly cognitive, affective, or volitional, involve an awareness of the self as the subject of them. When, therefore, a volition has taken place such as that outlined on page 305, one is conscious of oneself as the subject of it, and one attributes the sudden cessation of tension between the conflicting motives and the initiation of the resulting action to the self.

Knowledge of the characters and abilities of our pupils is a desideratum at all times. But perhaps we realise the need of it most when they approach the time for leaving, and the serious question of a career arises. The Headmaster or Head Mistress is usually greatly concerned at such a time, especially as he or she has a testimonial to write for each leaver. In some secondary schools there are *Careers Masters,* who occupy themselves not only with the question of determining the suitability of the boys for certain avocations but with finding satisfactory posts for them. In the elementary schools, the *After-Care Committees* deal with these matters. Secondary schools have a *Headmasters' Employment Committee,* in co-operation with the Ministry of Labour, with offices at Westminster, and there is a sister committee for the Head Mistresses. Similar committees have been established in the provinces, and there are other institutions of like nature in London such as *The Career Advisory Bureau* and, last but not least, the Vocational Guidance Department of *The National Institute*

[1] *Personality and Will,* p. 87.

of Industrial Psychology.[1] We may very well take the work done by this last-named institution as typical of the rest. And we may sum it up in the terms of a memorandum supplied to all those who attended the conference organised by the Institute on the subject of vocational guidance at University College, London, in January 1938—

> Work done: Vocational and educational guidance for individuals; vocational selection for firms and training institutions; research; preparation of tests and general advisory work for schools, local education authorities and others; training of teachers and others in educational guidance procedures and in intelligence testing.

The numbers dealt with in 1937 were over 1000 boys and young men and about 300 girls and young women. For 1938 the total number will be restricted to 1,250. These numbers seem disappointing; but the cost of this work is rather high. The normal fee is three guineas, increased to five for a consultation exceeding three hours. Schools arranging for a group of pupils are entitled to a reduction. "A small fund enables the Institute to make reductions in cases in which the normal fee cannot reasonably be afforded. This fund is primarily intended for the use of elementary school children and individuals sent to the Institute by child guidance clinics, hospitals, and probation officers."[2]

An excellent survey of the work of the Institute has been given by Mr. Charles Fox.[3] "At first," he tells us, "it was thought that the problem could be tackled on purely scientific lines, by means of suitable tests of intelligence, and tests of aptitude for specific occupational processes." But this was found to be inadequate. "Like child guidance, vocational guidance is becoming recognised as an art, in which an array of data must be assembled, and considered in the light of a variety of different considerations."[4] An attempt must be made to get a survey of the total personality, as shown by the impressions made in the minds of all the investigators and teachers who have dealt with

[1] Address—Aldwych House, London, W.C. 2.
[2] From the memorandum.
[3] *Educational Psychology*, pp. 408 ff. [4] *Ibid.*

the pupil. "However difficult this may be, and it is undoubtedly impossible except for those who have natural intuition into character, it is evident that the personality as a whole, as distinct from separate items within it such as temperament, special interests, etc., is by far the most important consideration in giving vocational advice."[1]

The value of vocational guidance is shown by its results. Mr. Fox gives a number of statistics. We may select two examples of them. In Fife, 85 children were given guidance and "followed up" for several years. The results were as follows:—

Attitude to work.	In posts taken according to advice.	In posts not taken according to advice.
Satisfied	35	22
Dissatisfied	3	25

These were elementary children leaving school at the age of fourteen. The following table gives the results in the case of nearly two hundred secondary pupils leaving school between the ages of sixteen and nineteen:—

Attitude to work.	In posts taken according to advice.	In posts not taken according to advice.
Satisfied	132	29
Dissatisfied	12	19

We may sum up this very brief account of vocational guidance by the words with which Dr. F. M. Earle closed the discussion on this matter at University College in January 1938. He said "that in the vocational guidance field we were still developing a relatively immature form of social work. A great deal had been done, but something

[1] *Ibid.*

higher had to be aimed at. The Institute held out an 'ideal,' and sometimes ideals had to be put into the background because of practical considerations. But they should not be allowed to drop out of sight. He supported the plan of providing training courses for teachers."[1]

And so ends our survey of psychological activity during the past few years. We began by noting the great diversity of modern views. And in the course of this short account we have briefly dealt with a great variety of researches. One may well ask whether it is one and the same subject that we have been discussing. We must bear in mind, however, that psychology is co-extensive with human life. And just as we have many different views of that life, considered from various points of view, so in psychology we must expect to find differing pronouncements. Truth has many facets. In practical life we are told at one time: *Too many cooks spoil the broth*; and at another: *Many hands make light work.* We know that each of these proverbs expresses a truth in certain circumstances. So in psychology. Each of the different schools expresses a facet of the truth. If we remember this, many of the apparent antinomies will cease to trouble us. As Mr. Mace said in his remarks as Chairman at the meeting of the British Psychological Society (Education Section) held at University College in January 1938, the different schools are no longer separated; we are now co-operating.

QUESTIONS ON CHAPTER XVIII.

1. To what extent is introspection necessary in psychology. How should it be supplemented ?

2. How would you answer the contention of the *Behaviourist* that introspection is valueless as a scientific method because one cannot control the observations of another.

3. What are the peculiar difficulties of introspection ? How can they be dealt with ?

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[1] Report, p. 364.

4. Give a brief account of Spearman's "two-factor" theory of intelligence.

5. On what principles are tests of general intelligence constructed?

6. Describe modern methods of dealing with the backward child.

7. What is the value of measurement in education? What are its limitations?

8. What are the criteria by which a test may be properly evaluated?

9. What do you understand by the *Intelligence Quotient* of a person? To what extent does it vary at different ages of the same person?

10. What changes have there been in the purpose of mental testing since its initiation by Binet?

11. What do you understand by *performance* tests, and what is their special purpose?

12. "An improvement in environment produces a gain in intelligence." To what extent is this statement true?

13. What do you understand by the *Gestalt* psychology, and what are its educational implications?

14. "The configuration theory swallows up what is true in the association theory." Discuss the truth of this statement.

15. What are *group tests*? What advantages have they over individual tests? What disadvantages?

16. What do you understand by *mechanical aptitude*? What account should be taken of it in organising school work?

17. How is character related to ability? What account could be taken of character in arranging the classes of a school?

18. What is "laziness"? Suggest some of its causes, and how you would attempt to deal with them.

19. How can the Child Guidance Clinic assist the teacher?

20. What is the value of vocational guidance? Give some account of its methods.

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